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AUTOMOTIVE INDUSTRIES

LAND — AIR — WATER

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NOVEMBER 13, 1937



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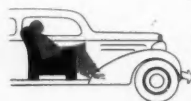
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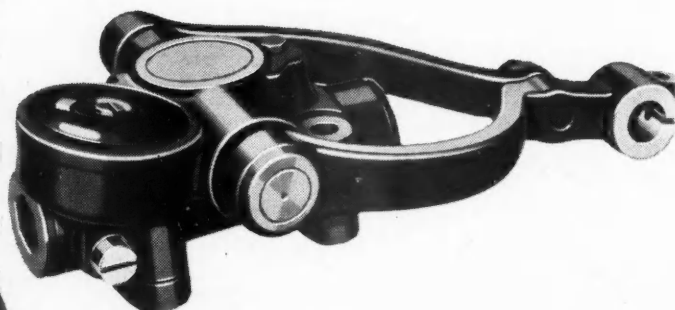
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Reg. U. S. Pat. Off.
Published Weekly

Volume 77

Number 20

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SUBSCRIPTION RATES: United States, United States Possessions, and all countries in the Postal Union, \$1.00 per year; Canada and Foreign, \$2.00 per year. Single Copies this issue, 25c.

Member of the Audit Bureau of Circulations
Member Associated Business Papers, Inc.

Entered as second-class matter Oct. 1, 1925, at the post office at Philadelphia, Pa., under the Act of March 3, 1879.
Automotive Industries—The Automobile is a consolidation of the Automobile (monthly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903, the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

Owned and Published by



CHILTON COMPANY
(Incorporated)

Executive Offices
Chestnut and 56th Streets, Philadelphia, Pa., U. S. A.
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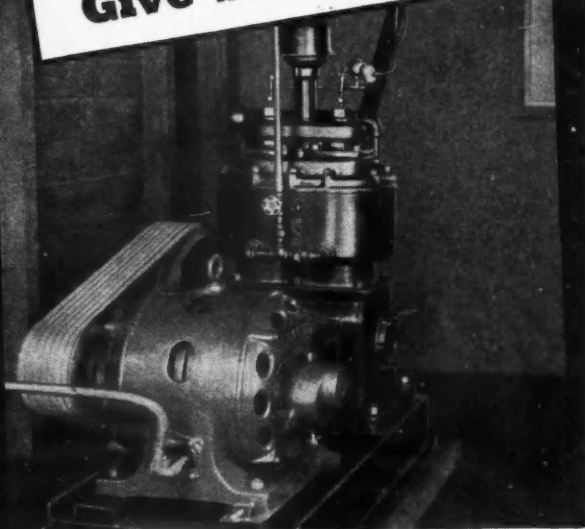
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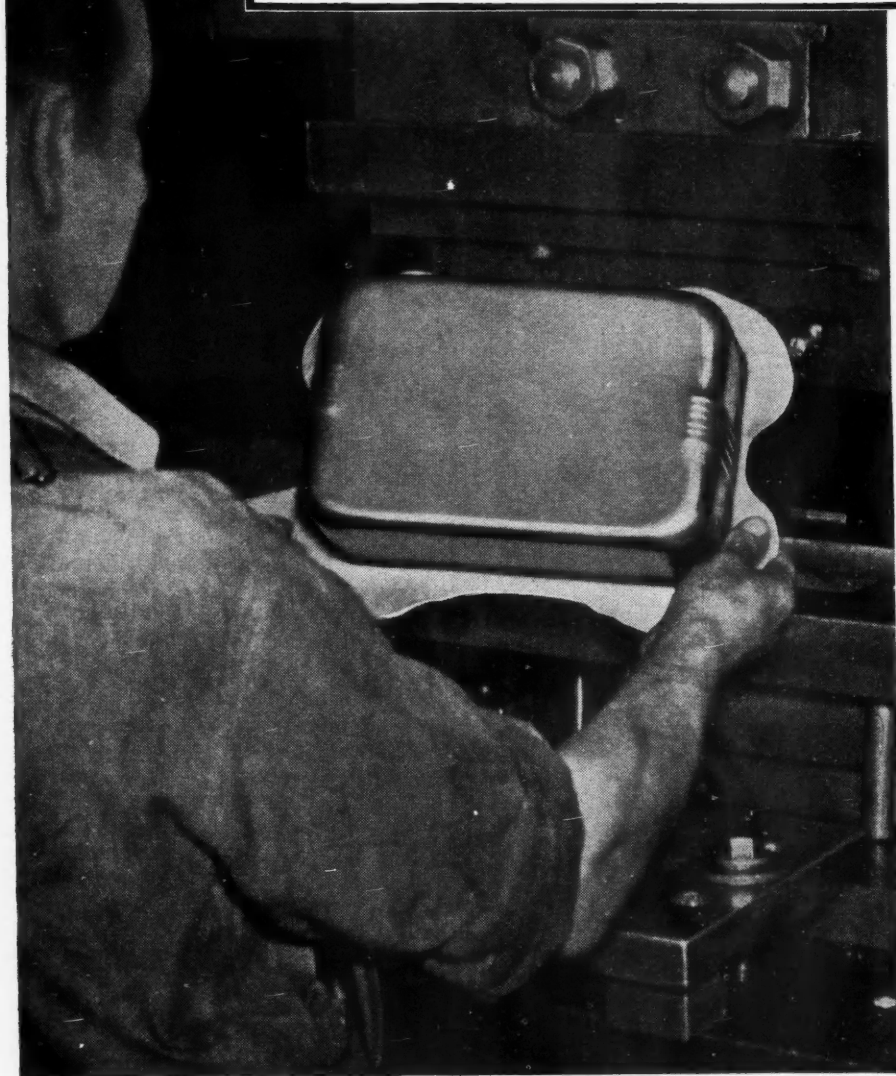
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November 13, 1937

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Automotive Industries

Output Eases Slightly

Plants Near Completion of Dealer Stocking

Easing of the automobile production rate in various quarters will make necessary downward revision of the November estimate for the industry. Whereas schedules at the beginning of the month indicated that output easily would equal the total of 405,799 units built in November last year, it appears now that the figure will be somewhat lower, perhaps moderately under the 400,000 mark.

The evident slackening of retail demand has prompted manufacturers to lower their sights for the winter months. While some are still pressing for greater output to meet requirements of dealers, the majority of companies have ample stocks in the field and are beginning to tune their operations to the pitch of demand and the near term outlook. In many instances, production raced upward swiftly after plants resumed on new models. The transition period was shorter than ever before and model changes less extensive than usual. Improved and expanded facilities of the plants permitted quick return to volume production. The result was a rapid increase in field stocks.

(Turn to page 699, please)

Hits Worker Attitude

Reeves Assails "Can't Fire" Viewpoint at Plants

The disturbing factor in the automobile manufacturing outlook now is the "very dangerous 'they can't discharge me' attitude of too many misinformed workers with chips on their shoulders, which is lessening efficiency to the point where it is adding to car costs," declared Alfred Reeves, vice-president and general manager of the Automobile Manufacturers Association, addressing the Detroit Rotary Club on Nov. 10.

He continued: "Add to this the attempts at sit-downs, slow-downs and other hampering actions in violation of agreements, which represent an attempt by workers to usurp the functions of management in determining what the output should be, and we have wage losses and additional costs that impair management's ability to reach

(Turn to page 703, please)



Wide World

RECENT MEETING

Recent meeting between septuagenarian Henry Ford and septuagenarian Herbert George Wells provided the setting for this remarkable character study of two men whose influence on the life and thought of their time has been profound. First recognition of Ford's place in world history came in 1920 in Wells' "Outline of History," itself responsible for chang-

ing the trend of historical writing. Said author Wells, in linking Ford with Robert Owen, the Great British social reformer of the Nineteenth Century: "His (Owen's) New Lanark experiment was the first of a number of 'benevolent businesses' in the world; Lord Leverhulme's Port Sunlight, the Cadbury's Bournville, and the Ford Businesses in America are contemporary instances . . ."

UAW Picking Up Loose Ends

To Use Political Organization in Ford Drive; Dispute Over Layoffs Closes Hudson Plant for a Day; Confer on Chrysler

The political organization set up by the United Automobile Workers Union to campaign for CIO candidates in the recent Detroit election is to be utilized in conducting the Ford union membership drive. Plan is to keep the organization intact and active until the next election in the city when the union forces again will enter the political arena. Far from being discouraged by their late defeat, union leaders point out that the vote for their mayoralty candidate exceeded the vote received

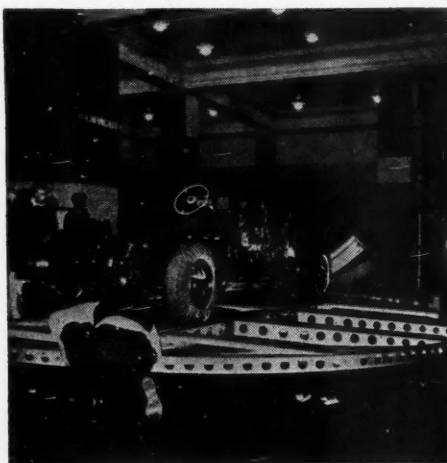
heretofore by any mayor in Detroit, save one.

Plans to further the UAW drive to organize Ford workers in the U. S. and Canada were to be considered at a meeting of delegates from plants in both countries, Nov. 13.

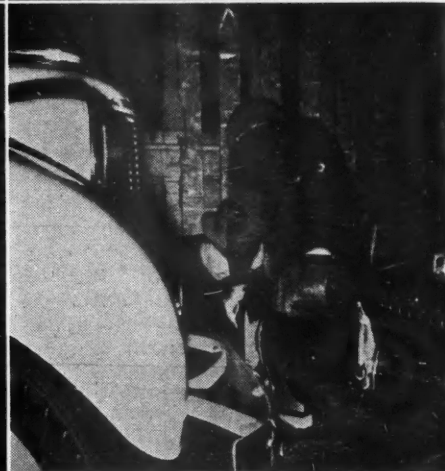
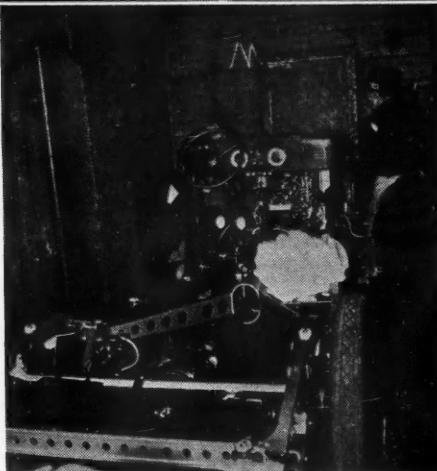
The first post-election labor trouble in an automobile plant occurred at

(Turn to page 703, please)

TRUCK SHOW REPORT
PAGE 697



WESTWARD moves the automobile show. Here is a series of pictures showing several of the steps required to move the exhibits to Chicago whose Automobile Show is now in progress. The upper left view is the dismantling of a turn-table display. Thirty-two express cars were loaded with special display material. They made up two special trains, one of which left New York at 8 a.m. the day after the show closed, and the other about noon. Upper center is the crating of a display engine, while at the upper right is shown the loading of an automobile into an express car at the terminal across town from the Grand Central Palace where the show was held. Just at the right is the blocking up of a chassis in a freight car to prevent damage in transit. Wheel blocks and strips of burlap were used. At the lower right a display chassis is being nailed down in a freight car.



Photos by Leslie Peat

AMA Reports Sales Gain

The Automobile Manufacturers Association estimates factory sales by the industry for October at 340,920 cars and trucks. This compared with 175,620 for September and with 230,049 for the month of October, 1936. The gain over the 1936 month was placed at 48 per cent.

For the first ten months of the calendar year shipments by American manufacturers were 4,295,933 units, a gain of 16 per cent over the 3,691,517 units shipped in the comparable period of 1936. Excepting for the record year 1929, the 1937 shipments set a high mark.

Fears Traffic Stagnation

There is a "submerged" market in this country for 5,000,000 to 6,000,000 automobiles not bought because prospective owners fear accidents and the inconvenience of traffic congestion, according to Dr. Miller McClintock, director of the Harvard University Bureau for Traffic Research, addressing a safety meeting in New York Nov. 8. Dr. McClintock warned at the same time that the current rate of increase in automobile and truck use will result within a year or two into practical stagnation of traffic movement on the major routes. He said that with 28,000,000 cars on the roads, the country is in a period of rapidly growing congestion. Dr. McClintock said he felt a result

would be a very costly decentralization of urban activities which would in the long run bring even more serious traffic problems.

It was forecast at the meeting that

the highway death toll this year will reach 40,000, and urged by speakers present, and in a message from President Roosevelt, that efforts be redoubled to achieve greater safety.

Sales of Cars Under \$750 Soar

"Big Three's" Proportion of Registrations Jumps 7.18 Per Cent In September as Price Increases Have First Apparent Effect

U. S. New Passenger Car Registrations and Estimated Dollar Volume by Retail Price Classes*

	New Registrations				Estimated Dollar Volume			
	September †		First Nine Months ††		September †	Per Cent of Total	First Nine Months ††	Per Cent of Total
	Units	Per Cent of Total	Units	Per Cent of Total				
Chevrolet, Ford and Plymouth	133,379	xx59.21	1,672,808	58.11	\$94,400,000	51.78	\$1,159,900,000	50.88
Others under \$750	3,476	1.54	43,439	1.51	1,900,000	1.04	24,700,000	1.08
\$751-\$1000	70,249	aa31.18	998,502	34.69	62,400,000	34.23	873,300,000	38.31
\$1001-\$1500	15,757	6.99	141,710	4.92	18,500,000	10.15	170,200,000	7.47
\$1501-\$2000	1,377	.61	10,719	.37	2,200,000	1.21	18,300,000	.80
\$2001-\$3000	915	.41	9,462	.33	2,300,000	1.26	24,800,000	1.09
\$3001 and over	140	.06	2,034	.07	600,000	.33	8,400,000	.37
Total	225,293	100.00	2,878,674	100.00	\$182,300,000	100.00	\$2,279,600,000	100.00
Miscellaneous	149		1,069					
Total	225,442		2,879,743					

* All calculations are based on delivered price at factory of the five-passenger, four-door sedan, in conjunction with actual new car registrations of each model. The total dollar volumes are then consolidated by price classes.

† Does not include data for returns from Wisconsin.

†† Does not include data for returns from Wisconsin for July, August and September. xx This figure was 55.24 in August against 57.54 in July. The September gain over August was 7.18 per cent.

aa This figure was 37.47 in August against 35.64 in July.

Truck Show Brings New Models

Unexpectedly Large Number Shown; Ford Preparing 2 COE Units; Trend Reported To Larger Trucks in 3-Ton-and-Up Range

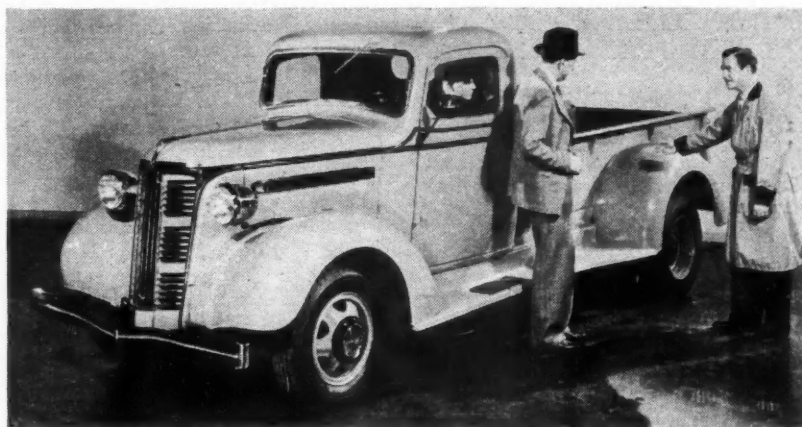
An unexpectedly large number of new trucks were on display at the opening of the fourth annual motor truck show in Newark, N. J., on Nov. 6. Manufacturers have become more sympathetic with the object of the show so far as its value as a medium of presentation of new developments is concerned, and in several cases showed new models there for the first time, or showed them there just after the closing of the New York Automobile Show. The sweep to cab-over-engine trucks has by now affected almost every manufacturer.

In addition to the actual exhibition of new models at the motor truck show, it was reported there as having been stated by factory sources that the Ford Motor Co. is to bring out two new cab-over-engine models, factory-built. They will be ready in February, 1938. One will be on a 101-in. wheelbase and the other on a wheelbase of 131 in.

New models appearing at the show included an example of a new line of cab-over-engine trucks manufactured by the Brockway Motor Co., a new bus chassis with the engine very far forward, available for the last few months but designated as a 1938 development, manufactured by the Reo Motor Car Co., three new GMC models, described as $\frac{3}{4}$ -ton, one-ton, and $1\frac{1}{4}$ -ton, the Studebaker Fast Transport, a new cab-over-engine model made by the Dodge Division, Chrysler Corp., and a White 40-passenger city bus powered by the 12 cylinder, under-the-floor engine. A special GMC airport refueling truck was also on exhibit. In addition, a number of new truck bodies were shown by leading body manufacturers including the Heil Co., Gar Wood Industries, Inc., American Coach & Body Co. and others.

The beginnings of a trend toward building-in the safety devices and signals required by the Interstate Commerce Commission and the several state

highway codes were noticeable at the show. Direction indicators, marker lights, headlights, horns, the latest in braking systems and the like are now supplied as factory-designed installations, and in some cases are so built in as to become part of the overall design. Brockway, for example, includes front direction indicators built into the front end sheet metal. The trend toward the use of bright colors and pleasing appearance clearly continues. A number of manufacturers have so constructed the driving compartments as to provide



LARGE BODIES are standard equipment on three new GMC trucks for the light-duty field. The $1\frac{1}{4}$ -ton model is shown. Others are rated as

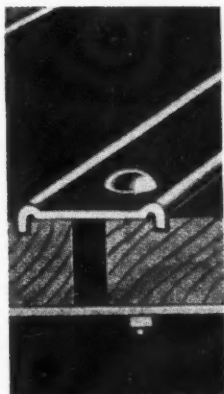
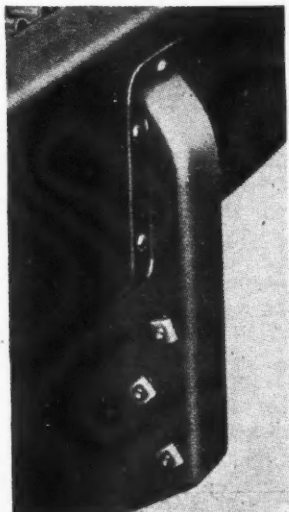
$\frac{3}{4}$ -ton and one-ton, the manufacturers having decided to cover the range with several models. The two larger trucks have wheelbases of 131 $\frac{1}{2}$ in. and the smaller one 126 in.

most of the conveniences now demanded in passenger cars. Special attention has been paid to the comfort and safety of the drivers. GMC offers factory-built radio equipment.

Within the heavier range of trucks, those in the three-ton-and-upward classes, there was reported an increasing business in the larger sizes. Company representatives and dealers explained that the purchase of the smallest trucks that could possibly handle the work was common during the depression years, operators preferring to

of the reverse idler, torque-tube drive, and spiral-bevel final drive having a reduction ratio of 6.67 where the 60-hp. engine is used, and 4.11 in connection with the 85-hp. engine. The rear axle is of the full-floating type. Front brakes are 12 by 1.75 in.; rear brakes, 15.12 by 2.5 in., giving a total braking area of 277 sq. in. The cast brake drums have reinforcing and cooling ribs. All four brakes are applied by the hand lever as well as by the pedal. Wheels are of the disk type and a spare wheel is standard equipment. Standard tire equipment is 6.50-17 in., six-ply, but 7.50-17-in. tires are optional at extra cost. The tread is 55.75 in. in front and 57 in. at the rear, and the truck has a turning radius of 20.75 ft. This truck, like the larger $1\frac{1}{2}$ -ton model, has semi-elliptic rear springs; the spring size is 45 by 2.25 in. and the spring material is chrome-alloy steel.

Front ends for the one-ton and $1\frac{1}{2}$ -ton models have been redesigned and made more attractive. Cabs also have been redesigned to harmonize with the streamlined hoods and the new radiator grille. Drivers seats in the cabs are now adjustable to three positions, and the cabs are fully lined and insulated against heat and cold. All cabs



FORD has made new efforts to give truck bodies longer life. At the left is shown one of the pressed steel caps which protect the rear ends of the wood sills. At the right is a cross-section of a floor skid strip which also holds the wood flooring in place.

now have a headlight-control switch on the toe board, with an indicator light on the instrument panel. Hoods are hinged at the cowl and lift from the front. Doors have friction-type checks which hold them in the open position. Safety glass is used throughout.

A number of improvements have been made in Ford truck bodies for 1938. In the rack body the forward rack sections are now hinged so they may be raised and swung outward. Steel stake sockets are secured to both sides of the platform frame rail by riveting and welding, and the tops of the rack sections have interlocking plates. On the stake and platform trucks the steel platform frame is secured to the ends of the body sills by means of pressed-steel caps which protect the ends of the wood sills when backing into loading docks. Steel platform frame rails riveted to steel cross girders protect the edges of the platform floor. Hardwood floor planks are protected by steel skid strips. Rolled edges of these skid strips fit into grooves cut in the planks and lock them together. The skid strips are bolted to the steel cross girders. Thus the planking is clamped securely and the floor is sealed, yet the planks are free to expand and the floor will not warp. A feature of the express body is rolled edges on the sides and a truss-type rolled edge on the tail gate. Drop chains of the tail gate have new fittings and locking links that clamp the body sides when the gate is closed. Panel rear doors are provided with sponge-rubber sealing around the edges.

On the 1½-ton model the length of wheelbase has been increased 2½ in., to 134 in. This model has a somewhat narrower frame, 34 in. wide, and now conforms to the standard body width. Another advantage of the narrower frame is that it permits of the use of larger tires and still leaves sufficient clearance for tire chains.

All trucks now have flat running boards. The cab is 1½ in. higher than formerly on the inside, measuring 36½ in. from the seat cushion to the roof.

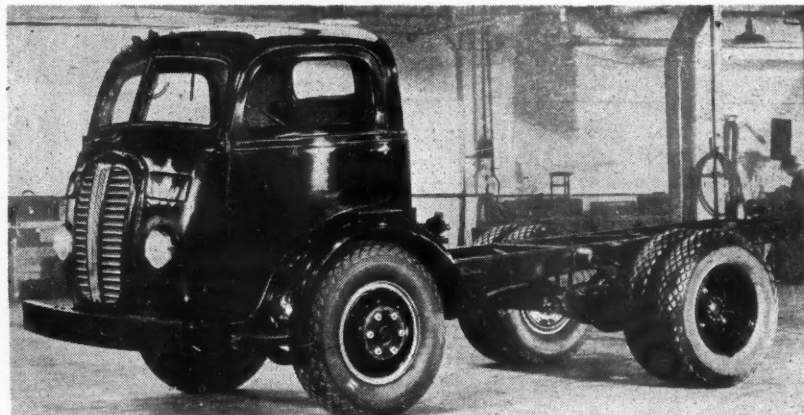
On the Ford stand there is shown also a sample of the Dearborn line of package-delivery cars built from Ford parts by Transportation Engineers, Inc., of Detroit. These are available with either the 60 or the 85-hp. engine. There is 10 ft. of loading space length behind the driver's seat and a total of 335 cu. ft. loading space. The body is of all-pressed-steel construction, and the delivery price in the New York area was given as approximately \$1,200.

General Motors Truck division showed three new models, and also announced that it is now offering a line of factory-installed extra accessories, the latter including such items as heaters, defrosters, radio sets, fog lamps, spot lights, cab ventilators, winter fronts, oil filters, air cleaners, bumper guards, hydraulic jacks, step plates, road flares, cigarette lighters, defrosting fans, auxiliary springs and sun-glare shields.

The new models are the T-145, T-15 and T-155. The first-mentioned is a ¾-

ton model with a 223-cu. in. L-head engine of 3 7/16-in. bore by 4-in. stroke. It has a wheelbase of 126 in. and the distance from the back of the cab to the end of the frame is 90½ in. The transmission is a three-speed synchromesh type with shift lever on the cover, and the drive to the axle is through one solid and one tubular propeller shaft, both enclosed in a torque tube, with a center joint supported by a ball bearing. The rear axle is of the semi-floating, spiral-bevel-gear type and has a reduction ratio of 4.11. Stamped-spoke wheels with integral drop-center rims of 15-in. base diameter are standard equipment. These wheels, which are demountable at the hub, carry 7.00-15 six-ply balloon tires as standard. A spare wheel is included in the equipment. Various other sizes of balloon tires, up to 7.50-15 eight-ply on standard-type wheels and 6.50-18 six-ply balloon tires on wire-spoke wheels are available at extra cost.

Model T-15 is a 1-ton model with an L-head 222-cu. in. engine of General Motors manufacture, of 3 7/16-in. bore by 4-in. stroke. It has a 131½-in. wheelbase and comes in pick-up and stake bodies. It has a three-speed synchromesh transmission and a spiral-



NEW DODGE cab-over-engine model exhibited at the Truck Show in Newark. It comes in four wheelbases, 96, 108, 122 and 140 in. and is powered

with a 3¾ by 5-in. six cylinder engine. The cab has divided seats and heavy insulation against engine heat and noise. Gross-vehicle-weight rating as a truck is 20,000 lb.

An exhibit on the General Motors Truck stand that attracts considerable attention is a "streamlined refueler" specially built for the Texas Co., for use in refueling the new 38-passenger air liners of the TWA, which carry a fuel supply of 2200 gallons. A feature of this "refueler" is that it is capable of putting gasoline into the tanks of the liner at the rate of 350 gals. per min., without condensation, the fuel being forced through strainers which remove all moisture. The vehicle also carries a supply of oil for the air liner in a special compartment of its tank, and the oil is brought up to engine temperature by means of electrical heating equipment installed in the tank, before it is discharged into the plane. This refueling truck has a 450-cu. in. engine of 130 hp.

Dodge division of Chrysler Corp. also announced its 1938 truck line at the show. Mechanical specifications have not been changed, but the front-end appearance has been improved and Dodge has introduced a cab-over-engine model, known as the RP series, which comes in four lengths of wheelbase (96, 108, 122 and 140 in.) and is equipped with a six-cylinder L-head, 3¾ by 5-in. (331 cu. in.) engine. As a truck the gross-

vehicle-weight rating of this series is 20,000 lb. and as a tractor-trailer combination, 34,000 lb. The cab has divided seats and its interior is finished in gray. The equipment of these trucks includes a package compartment, cowl ventilators, a black-enameled radiator shell, crowned front fenders, tire carrier (except on the short-wheelbase model), spare wheel, electric horn, controlled-beam-type headlamps, electric fuel gage, oil-pressure gage, heat indicator, electric starter, speedometer, ammeter, locking ignition switch, choke, throttle control, license brackets tool kit, and black front bumper. The engine hood inside the cab is heavily insulated against heat and noise.

On the White stand is shown, among other models, a 40-passenger, city-type (Turn to page 727, please)

Model T-155, of 1¼-ton rating, has a six-cylinder engine with 229-cu. in. piston displacement, of 3 7/16-in. bore by 4½-in. stroke; a three-speed transmission and a spiral-bevel rear-axle drive of 4.57:1 or 5.14:1 ratio. The tire size is 6.50-16 in. This model also has a wheelbase of 131½ in. and is provided with a pick-up body.

On the White stand is shown, among other models, a 40-passenger, city-type

Buys Marmon Plant

Stewart-Warner to Move All Refrigerator Work

The Stewart-Warner Corp. announced on Nov. 11 that negotiations for the purchase through a subsidiary of Plant No. 2 of the Marmon Motor Car Co. at Indianapolis, Ind., were in an advanced stage.

By the purchase, Stewart-Warner acquires 22 acres of land, and buildings aggregating 539,000 sq. ft. of floor space, the largest of the three Marmon plants. The sale was made by the liquidating trustees of the Marmon company. In announcing the negotiations, J. E. Otis, Jr., president of Stewart-Warner, said: "It is our intention to transfer all refrigerator manufacturing operations from Chicago to our new plant in Indianapolis. The plant was acquired at a price far below the cost of erecting similar buildings today."

Atlas Press Co., Kalamazoo, Mich., recently completed a plant addition which provides 15,000 sq. ft. of additional floor space. The new floors are being used to increase production of the company's bench lathes, shapers, drill presses, and arbor presses.

J. I. Case Co., Racine, Wis., manufacturer of industrial and farm tractors and implements, is considering estimates on the construction of a new heat treating shop providing 100,000 sq. ft. at its tractor works. Decision to proceed, it is said, depends upon business trend during remainder of the year and the outlook for 1938.

International Harvester Co. is starting work on two wing additions to the heat treating shop of its tractor works at Milwaukee, estimated to cost \$65,000 with full equipment.

Highway Trailer Co., Edgerton, Wis., manufacturer of freight trailers, refuse and dump trailers, etc., has plans for a \$50,000 addition to its main works, on completion of which present branch production operation will be moved from Stoughton, Wis.

Screw Machine Products Co., Milwaukee, has broken ground for a com-

plete new plant of its own, 80 x 200 ft., in the town of Lake, Milwaukee County, at a cost of about \$50,000. The new shop will provide about 30 per cent more space than present leased quarters.

Koehring Co., Milwaukee, manufacturer of gas, diesel and electric powered excavators, shovels, concrete mixers, etc., has set aside \$75,000 for the purchase of new equipment over a period of several months to make itself more self-contained as to parts production.

Output Eases Slightly

(Continued from page 695)

A contributing factor in the reduction made necessary in the November output estimate is the delay of the Ford Motor Co. in returning to volume production. The daily rate of assemblies is understood now to be better than 300 units and should accelerate more rapidly from this point since assembly branches are getting back into operation. The past week's output of the industry also will reflect the loss of one day by all Chrysler divisions which were closed on Friday. Half-day operations were in effect Thursday and Friday at the Hupp plant. Pontiac worked only four days last week. The Hudson plant was closed one day during the past week by a labor dispute. In many instances, now that dealers are stocked, the rate of operations, or the number of days worked per week, will be determined from week to week by the rate of retail sales.

While retail deliveries up to the first of the month had been making favorable comparisons with a year ago, sales resistance was developing. Advance retail orders were not being booked, and dealers began to cancel some of their factory orders. Neither dealers nor factory sales officials are prepared to say as yet whether higher prices or impairment of confidence in the business outlook is the principal factor in the softening of the retail market for motor cars. General attitude of the factories toward prices is that conditions will have to be a lot different from what they are before any price concessions are made.

—H. E. G.

The Studebaker Corp. reports the sale of 8389 passenger cars and trucks in October compared with 12,150 in October, 1936. For the year to date Studebaker sales of 81,724 compare with 75,449 in the first ten months of last year.

Electric Auto-Lite Co. has announced a six-hour, five-day week for all plants except those making batteries, in order to scale production to car assembly requirements.

Spicer Mfg. Corp. has reduced the hours worked the week of Nov. 8 due in part to a hold-up on Ford orders.

Graham has projected a 1938 season production schedule of from 30,000 to 44,000 units. Tractor production to fill a 2000-unit Sears, Roebuck order is to begin in January at the rate of 25 daily. Car production is expected to reach 150 daily by the end of this month. The Graham-Bradley tractor won the Imperial Trophy in an international plowing match at Fergus, Ont., recently, an event which is prepared for with great care by tractor manufacturers.

Sales of Nash automobiles in September were 110.4 per cent greater than those of September in 1936, it was announced by C. H. Bliss, vice-president and director of sales of the Nash Motors division of Nash-Kelvinator Corp.

Shipments of the Hudson Motor Car Co. in October totaled 15,269 cars, a gain of 56 per cent over the 9782 cars shipped in October, 1936. October shipments consisted entirely of 1938 models. The total shipments of 1937 models now completed were 122,791 cars. W. R. Tracy, vice-president in charge of sales stated that an earlier start this year on new model production was in part responsible for the large October increase. Production schedules for early November have been set at the October rate.

This year a total of 167,413 Oldsmobiles were delivered by October 31, as compared with 152,039 units during the same period of 1936.

Demand for Buick cars during October was such that a shortage existed in some models necessitating revision of production schedules at the factory for November. It was disclosed by W. F. Hufstader, general sales manager. Buick sales for the month, he said, were 18,009 units, an increase of 7828 cars or approximately 77 per cent over the corresponding period a year ago. Indicative of a sustained demand, the executive said, is that deliveries during the last 10 days of October reached 7439 units with unfilled retail orders mounting. This compared with 6067 in the last 10 days of October, 1936. Used car sales for the 10 days period were 10,476 cars, he said.

Retail deliveries of new Pontiacs in October were 13,536 compared to 6576 for the same month of 1936. September sales were just ten cars less or 13,526 which compared to 8811 for September the year before. Reports from the factory show that more than 75 per cent of the 1938 cars are being sold with the new type of gear shift. Sales of accessories during October established a new high record with Pontiac dealers for a single month.

GM October Sales Jump

Far Above 1936 Month On Seasonal Show Bulge

All sales figures reported by General Motors showed very sharp gains for October against both the preceding month and the same month in 1936. The gains occurred in a month which included the higher prices on the first of the 1938 models sold, as well as the higher prices on late 1937 cars. There is available no division of sales to indicate the extent of the clean up on late 1937s in anticipation of higher prices for the new cars.

Following are the comparative sales figures:

	October	September	October	Model Year	
	1937	1937	1936	1937	1936
Sales to domestic dealers	136,370	58,181	69,334	1,771,714	1,627,347
Sales to domestic consumers	107,216	66,664	44,274	1,716,170	1,680,246
Change in dealer stocks	+29,154	-30,383	+25,060	+55,544	-22,899
Sales to foreign dealers	30,568	24,136	21,430	420,437	347,961
Sales to world dealers	166,938	82,317	90,764	2,192,151	1,975,308



J. M. McNEAL, European sales manager of the Landis Machine Co., Waynesboro, Pa., has returned to the home office for a visit. Mr. McNeal is headquartered at Birmingham, England, but also handles business on the Continent.

C. ALFRED CAMPBELL, nationally known automotive sales, advertising, and sales promotion engineer, has been appointed to the position of general sales director of the Marmon-Herrington Co., Indianapolis, Ind.

ALFRED P. SLOAN, JR., chairman of the board of General Motors Corp., is scheduled to address the 31st annual convention of the Association of Life Insurance Presidents to be held in New York, Dec. 2 and 3.

Business in Brief

Written by the Guaranty Trust Co., New York

Decline Extended

General business activity declined for the fifth consecutive week during the week ended October 30. The business index compiled by the *Journal of Commerce* during that period stood at 95.0 as compared with 97.1 the week before and 101.3 a year ago. Declines were registered by all the components of the index, with the greatest reductions in automotive and steel activity. Retail trade ranged from 2 to 6 per cent above that in the preceding week and from 4 to 15 per cent above that in the corresponding period last year.

Railway freight loadings during the week ended October 30 totaled 771,655 cars, which marks a decline of 1698 cars below those in the preceding week, a reduction of 42,859 cars below those a year ago, but a gain of 89,657 cars above those two years ago.

In order to meet the rising cost of operation, the Association of American Railroads decided last month to petition the Interstate Commerce Commission for an immediate increase of 15 per cent in freight rates, excepting in the cases of coal, lumber, fruits, vegetables, and sugar, for which certain maximum rates will be requested.

Power Output Over Last Year

Production of electricity by the electric light and power industry in the United

States during the week ended October 30 was 4.1 per cent above that in the corresponding period last year.

Production of lumber during the week ended October 23 stood at 68 per cent of the 1929 weekly average. Reported output was 34 per cent above the level of new business and 15 per cent heavier than shipments. All three items were lower than a year ago.

According to the Bureau of Labor Statistics, employment in manufacturing and non-manufacturing industries during September was higher than in any other month this year. More than 190,000 additional workers found employment during that month, although combined payrolls were moderately lower.

Fisher Index Down

Professor Fisher's index of wholesale commodity prices for the week ended November 6 stood at 87.9, as compared with 88.1 the week before and 89.3 two weeks before.

The consolidated statement of the Federal Reserve banks for the week ended November 3 showed an increase of \$1,000,000 in holdings of discounted bills. Bills bought in the open market and Government securities remained unchanged. Money in circulation increased \$46,000,000 and the monetary gold stock rose \$3,000,000.

tion to realize the restriction scheme's primary object—the prevention of severe price fluctuations. Dissension among Far East producers continues, and there is strong opposition to the proposed lowering of the production quotas on the part of Malayan interests.

That copper dipped further as the result of the general recession in London metal prices, caused less surprise. Producers here quote 11 to 12 cents, with offerings in the "outside" market early in the week at 10 cents and the "export price" down to 9.60 cents. Bargain hunters bought some copper, but most consumers were offish. Copper and brass products prices were revised downward in keeping with the lower cost of the basic metal.

When the price of lead dipped to 5 cents, New York, one of the large producers let it be understood that sales at that level would be held down as much as possible. Zinc smelters are striving to curtail output as a means of coping with declining prices.

It is however, noteworthy that buying by consumers was impressively light when, as many thought, prices were scraping bottom. Some buying of tin was noted when the market was around 44 to 45 cents, but when it declined to 42 cents, sellers could not find any buyers. On Tuesday, when the market recovered to 43½ cents, interest was better than at the 42-cent level. —W. C. H.

Graham Finances

Graham-Paige Motors Corp., has added \$1,000,000 of new working capital through the sale of 5 per cent convertible notes, according to well authenticated financial district reports. The funds will be used to finance the new tooling program required by the introduction of the 1938 cars, and to begin the company's advertising and sales promotion campaign which is expected to be the largest in the company's history. The company is also reported to be negotiating for the sale of the last of its idle plants left unused when production was concentrated in the main plant.

... slants

HORSE OUTLOOK—The long decline in the number of horses and mules in this country will probably continue until 1940 or 1942, estimates the Bureau of Agricultural Economics. By that time the number of colts raised will equal the disappearance of older animals from farms, while the low point in the number of animals of working age will occur two or three years later. The bureau feels that the number of working horses and mules now may represent the maximum number needed. Adjustments in colt production are urged to compensate for gains in the future use of mechanical power.

IT SEEMS TO WORK—New York's new express highway on the West Side of the city does save a considerable amount of time for those bound far uptown, or far downtown, it was proven by a recent test involving four private cars and a taxi selected at random. Five different routes were used, two using at least part of the express route and three the city streets. The

Automotive Metal Markets

Steel Prices Fail to Show Signs of Weakening in the Face of Reduced Operations; Non-ferrous Markets Irregular

While steel mill operations are being adjusted to lessened demand, the steel market remains unchanged. Mention is frequently made of the Patman Act serving to deter the smaller producers from making price concessions surreptitiously, but the chief support of the prevailing price structure comes from the generally held conviction that at this particular time lowering of prices would prove futile as a means of quickening buying.

More and more the impression is gaining ground that fourth-quarter shipments into consumption are hardly likely to improve very much, and curtailment of operations with possible December shut-downs of units which can be advantageously reconditioned then are forecast. Developments over the next six weeks will, of course, have a vital bearing on the attitude of steel sellers and buyers.

Rumors are making the rounds that efforts on the part of some consumers to obtain price concessions on flat steels in the last few weeks proved unsuccessful. Purchasing agents for automobile manufacturers are placing orders in routine fashion. With the labor situation in automotive plants what it is and the uncertainty arising from the special session of Congress a definite factor, major executives are deferring consideration of any policy changes.

With a number of steel-consuming

industries entirely out of the market, automotive buying, light as it is, makes a relatively favorable showing, but very little advantage, if any, accrues to automotive consumers from having the market all to themselves. The steel industry cannot operate profitably when trimming of operating schedules is a first consideration, and what business comes in as a matter of routine must bear a larger share of the overhead burden than it would if mills were normally busy.

Amid the adverse influence of security markets, it was little wonder that non-ferrous metal prices yielded further ground. What is rather remarkable however, is that the sharp rise in sterling exchange, which means that it will take more American dollars to pay for Straits tin, failed to halt the downturn of tin prices. Spot Straits was offered at 42 cents on Nov. 8, \$40 a ton below the previous close and around \$240 a ton below the price on the corresponding day of the month before. In this connection it is interesting to note that J. van den Brook, managing director of the Billiton company, one of the large tin producers, on his return to Amsterdam, following a tour of the United States, said that President Roosevelt and others in the United States were at a loss to understand why the International Tin Committee, controlling 90 per cent of the world's tin output, was not in a posi-

express highway saved from 11 to 24 minutes over the best time on the other routes. Strangely, the car which used the lower half of the express road and then took the old Riverside Drive for the upper half made better time than the car which used the entire express route. This was explained by the statements 1—that so many cars use the express route that Riverside Drive has become free of congestion, and 2—that part of the express route construction is not yet complete. The taxi driver, running on city streets, complained that his time was cut by quick-shifting traffic lights, a new development in the city. Evidently, he failed to start on the flash of the green. One of the cars on the city streets found that of its 46-min. running time, 28½ min. was waiting time for lights. This is about what was expected as the lights run 60 sec. north and south green, and 30 sec. east and west green. Fastest time was 31 min., slowest 59 min. The distance was 13½ miles.

ROBOTS FOR HUMANS IN WAR—

J. Hashizume, a leader of the Imperial Automobile Association of Japan, proposes to equip Datsun and similar cars with a robot piloting device. Such automobiles may be loaded with powder and sent through enemy barricades, replacing the famous "human bombs," he suggests.

GM Traffic Groups Formed

For the purpose of establishing more uniform policies and practices with respect to the movement of freight and the more ready exchange of helpful information between divisions of the corporation, the General Motors Traffic Association has been formed, it was announced by W. S. Knudsen, president. Traffic managers of the various General Motors divisions throughout the United States will be members of the association.

C. R. Scharff, traffic director of the

40 Years Ago

with the ancestors of
AUTOMOTIVE INDUSTRIES

Letters to the Editor

THE HORSELESS AGE is the most valuable promoter of an industry doubtless destined to an important future in America.

F. W. CRAGIN,
Professor of Geology in Colorado College,
Colorado Springs, Colo.

I believe that you deserve the support of all who believe in the future of the motor wagon.

P. S. MALCOLM.

Portland, Ore.

I commenced with your journal in the beginning, and I shall continue as long as you deserve it. I therefore enclose check for \$2 for another year. I must say THE HORSELESS AGE is edited with great ability. You stick to the cause and in your editorials use reason and common sense.

A. B. HARING.

Frenchtown, N. J.

From *The Horseless Age*, Oct., 1897.

Chevrolet division, has been appointed chairman. Leo Shaw, formerly traffic manager of the Linden division of General Motors, has been appointed secretary of the association, with headquarters in Detroit.

The first meeting of the association was scheduled to be held in the General Motors Building, Detroit, Nov. 11 and 12.



European

HELMETS worn by German motorcycle racing drivers. They serve the dual function of protecting heads and necks, and of streamlining the drivers as they lean forward and ride low.

Divco Has New Model

A new model U house-to-house delivery truck is announced by the Divco-Twin Truck Co., Detroit, Mich. Styling has been improved and the lines now flow front to back. Lights are built in and the windshield is slanted backward with the driver seated close behind it for better vision. Side windows are of the rotating type. A book pocket is provided and an instrument panel is wide enough to provide space for an open route book, while there is storage space under the front floor for the driver's personal equipment. The through-aisle is lower and operating devices are clear of it. Compression ratio of the engine is now 6.07 to 1, against the former 5.6 to 1. Brakes, water pump and radiator are improved and the battery is in a more accessible place on the front side of the dash.

Auburn Reports

Auburn Automobile Co. reported for the September quarter a net loss of \$703,449 after an inventory write down of \$286,622. This compared with a net loss of \$322,584 in the preceding quarter and with a net loss of \$100,028 in the August quarter of last year.

Company Earnings

Timken Roller Bearings

Reported net income for the September quarter of \$2,756,245 or \$1.14 a share, against \$2,023,773 or 84 cents a share in the 1936 period. For nine months the net income was \$9,548,423 or \$3.96 a share against \$6,630,768 or \$2.75 a share last year. The board declared an extra dividend of \$1.75 and the usual quarterly dividend of 75 cents a share at a meeting Nov. 5.

Bohn Aluminum and Brass

Reported net income for the September quarter of \$309,778 or 85 cents a share, against \$307,693 or 87 cents a share last year. An extra dividend of 50 cents and the usual 50 cent quarterly dividend were declared Nov. 4.

City Auto Stamping

Reported net income for the September quarter of \$140,056 or 37 cents a share, against \$192,794 or 51 cents a share in the 1936 period.

Borg-Warner

Reported net income for the nine months ended Sept. 30 of \$5,561,156 or \$2.41 a share on the 2,302,018 common shares now outstanding. For the like period of the preceding year the net income was \$4,861,644, equal to \$4.14 a share on the then 1,150,967 shares after preferred dividends on stock then outstanding. The balance sheet of Sept. 30 showed current assets of \$30,382,428 against current liabilities of \$9,091,577. Cash and security holdings totaled \$8,790,530 and inventories \$13,691,586. A comparison showed a shifting of cash into inventories.

Douglas Aircraft

Reported for the nine months ended Aug. 31, including operations of the Northrop Corp. for the entire period, of \$852,795 or \$1.49 a share. Provision of \$250,000 was made to surtax. For the like period last year the company reported net income of \$277,644 or 50 cents a share on the slightly smaller amount of stock then outstanding.

Curtiss-Wright

Reported net income for the third quarter of \$690,987, covering class A dividends, against \$440,321 or 38 cents a share on the class A stock in the like quarter of 1936.

Wright Aeronautical

Reported net income for the third quarter of \$610,596 or \$1.02 a share, against \$276,917 or 46 cents a share for the 1936 period.

Boeing Airplane

Reported net income for the September quarter of \$121,546 or 17 cents a share against \$39,289 or 7 cents a share on a smaller number of shares outstanding for the like quarter of 1936.

Fairchild Aviation

Reported net income for the first nine months of the year of \$124,827 or 37 cents a share against \$25,116 last year.

Evans Products

Reported for the September quarter net income of \$167,396 or 69 cents a share, against \$135,186 or 55 cents a share. For nine months the net income was \$347,816 or \$1.42 a share against \$412,642 or \$1.60 last year. No surtax deduction was made.

Van Norman Machine Tool

Reported net income of \$270,455 or \$3.04 a share for the first forty weeks of the year, against \$289,966 or \$3.26 a share for the like part of last year. The company stated that higher labor costs and a July strike cut the earnings.

National Supply

Reported net income, on its new corporate basis which includes Spang, Chalfant & Co., for the first nine months of the year, of \$6,614,289 against \$2,881,843 last year. Per share comparisons are impossible because of current preferred share conversions. Third quarter earnings were \$1,846,150 against \$1,047,311 for the third quarter of last year.

SAE Told of Maintenance, Design

Regional Transportation Meeting at Newark Brings Out Numerous Papers on Truck and Bus Operation

Bus maintenance, truck design and matters of general automotive interest were covered in papers read at the SAE Regional Transportation meeting held in Newark, N. J., Nov. 9 and 10, in conjunction with the Motor Truck Show. There were 250 registered the first day. Four sessions were scheduled, two afternoon and two evening, and in between, on Wednesday morning, members and guests made an inspection trip to the new GM assembling plant at Linden, 9 miles from Newark.

The Tuesday afternoon session was devoted to bus maintenance, although one of the three papers presented was of a general automotive character. Chris Bockius of Raybestos-Manhattan, Inc., presented a paper on Brakes, prepared in collaboration with John Bassett of the same firm. According to the authors, good results from the stopping standpoint are obtained if vehicles have a braking area of 1 sq. in. for every 30 lb. of gross vehicle weight. Legal requirements can be met with a smaller specific braking area, such as a square inch for 40 or even 50 lb., but this calls for brake linings of greater friction coefficient, the use of which is usually accompanied by an increased rate of wear.

J. H. Middlecamp of the Brooklyn Bus Corp., in a paper on "Prevention of Recurring Failures," sketched a number of maintenance systems and gave the advantages and disadvantages of each. He emphasized the importance of keeping card records of the maintenance history of all vehicles and that these records must be written by the repairmen or the shop foreman, not by the office staff.

In a paper on "Fleet History as a Guide to Maintenance," W. J. Cummings, of the Surface Transportation Corp., gave a list of the causes of interruptions in service and their respective importance on a percentage basis. He found that tires were the most prolific cause of trouble, accounting for from 10 to 40 per cent of the "interruptions." This, he said, was largely due to the nature of the routes operated on and the type of equipment used.

A review of developments in truck design was given in a paper by Joseph A. Anglada, consulting engineer, who dealt with such subjects as cab-over-engine trucks, cabs and bodies, streamlining, six-wheel vehicles, all-wheel-drive vehicles, the A.E.C. English eight-wheeled truck, power brakes, engines, Diesel engines, generators, clutches, transmissions, springing and legal regulations. As to the market for cab-over-engine trucks, Mr. Anglada felt that for some time to come it would not exceed 50 per cent of the total truck market, and this view was concurred in by B. B. Bachman, vice-president in charge of engineering, The

Autocar Co., in commenting on paper.

At the Wednesday afternoon session F. K. Glynn of the American Telephone and Telegraph Co. presented a paper on "The Economics of Truck Selection." He pointed out that a wide choice is offered the operator, as a very large number of "basic" models is listed by American manufacturers, and that it is possible to meet the requirements of any trucking or transportation job no matter how peculiar. Within reasonable limits the price paid for a chassis is indicative of its relative strength, durability and "ability." First cost and operating cost go hand in hand and pay dividends in work produced only when the proper chassis is selected. Chassis ability, both tractive and load-carrying, is an important consideration in the selection. Complete operation and transportation-job analysis is also essential to the correct chassis choice and to the reduction to a minimum of both investment and operating expense. Other important considerations include availability of parts and service, inherent safety of design, and legal restrictions.

At the final session of the meeting, J. G. Moxey, transportation engineer of the Sun Oil Co. read a paper on "Semi-Trailers vs. Six-Wheelers," and while the author seemed to lean toward the six-wheeler he admitted that the tractor-semi-trailer combination was in much greater favor with manufacturers and had definite advantages in certain applications such as inter-terminal or shuttle service, where a few tractors can take care of a large number of trailers because of the relatively long time required for loading and unloading.

"Proving Ground" Date Nov. 16

The annual new car demonstration or proving ground event of the SAE Metropolitan Section will be held on the Roosevelt Raceway at Westbury, Long Island on Nov. 16, beginning about 10 a. m. In the evening there will be a meeting at the Roger Smith restau-

rant in New York City, beginning with a dinner at 6:30, at which the chief engineers of the various car companies will explain the reasons for the changes made in their models for 1938. The meeting is restricted to SAE members and factory representatives.

Hercules Motors Reports

Hercules Motors Corp. reported net income for the September quarter of \$260,372 or 84c. a share against \$170,687 or 55c. a share in the like period of last year. For nine months the net income was \$890,358 or \$2.86 a share against \$420,785 or \$1.35 for the 1936 period.

Goodyear Resumes

Goodyear Tire & Rubber Co. has resumed operations in its passenger car tire production departments Nov. 10 after a shut-down since Oct. 28, reinstating several thousand employees. Goodyear Plant No. 1, confined largely to production of truck tires, closed for only three days for inventory-taking.

New Denham Service

A service designed to bridge the gap between inventors of ideas of potential use to the automotive and allied industries and the men to be reached in the industry itself is announced by Denham and Co., Detroit.

In announcing this expansion of the Denham and Co. services, Athel F. Denham emphasized that the new service will operate entirely independently for the benefit of inventors on a free basis. It comprises:

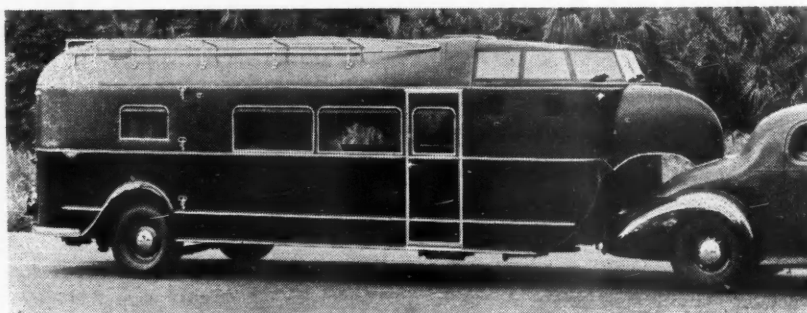
1—Consultation with and advice to inventors on whether or not there appears to be a market possibility for their inventions, based on intimate knowledge of the needs of the industry; 2—On inventions which appear to possess merit inventors will be put in touch with the particular organizations and men most likely to be interested in the development; and 3—If desirable, direct assistance will be furnished inventors in the marketing of their products.

Ford Bus Sales

Sales of Ford Transit buses are on the increase. In one week recently the Ford Motor Company received orders for 65 buses from sources located in widely separated sections of the country.

Nash on Air

"Professor Quiz." The contract renewal with the Nash-Kelvinator Corporation, for Nash Motor Cars, is effective December 4. The program is heard over 61 CBS stations every Saturday from 9 to 9:30 p.m., EST. Geyer, Cornell & Newell, Inc., is the agency.



SUPER deluxe is the term used by the manufacturer to describe this large Curtiss Aerocar which lists at \$8500, f.o.b. the factory.

L. C. Chase & Co. supplied interior and exterior body-covering fabrics, using "Leatherwove" for inside and outside walls and a mohair seat fabric.

UAW Loose Ends

(Continued from page 695)

Hudson Motors, Nov. 9, when UAW Members in the paint shop, objecting to the lay off of eight union employes, refused to continue work. The management was forced to close the entire plant for the day. Conferences with union representatives resulted in the resumption of work the morning of Nov. 10 while the company carried on time studies in the paint department. The men laid off were not returned. The company maintains the department was overstaffed and that time studies will show that 12 men should have been laid off instead of eight.

Plant No. 2 of the Bohn Aluminum & Brass Corp. was closed on the afternoon of Nov. 9 when the day shift protested against hiring of five new employes after 20 workers had been laid off. It was the sixth time this year that strikers had closed a unit of the Bohn company, which has an agreement with the UAW signed March 24. Company officials declared that the dispute resulted from a misunderstanding of provisions of the new state occupational disease law. The employment status of about 20 men is involved.

A meeting of delegates from all Chrysler locals of the UAW is to be held in Detroit, Dec. 4, for the purpose of determining policies the union will pursue in contract negotiations with the corporation. Meetings of the Plymouth local, which were to be held last week, to consider taking a strike vote were called off. The UAW president, Homer Martin, and vice-president, R. J. Thomas, were to confer with a committee from the local on the situation at the Plymouth plant.

Representatives of all General Motors locals are scheduled to meet in Detroit, Nov. 13, to receive the report of the negotiating committee which has been conferring with GM officials in connection with revision of the corporation's contract with the union. Considerable dissatisfaction is said to exist among rank and file union members over the slow progress being made in the GM negotiations.

Union members are also said to be getting more and more restless over the inactivity of leaders in connection with the Ford drive. It was the subject of heated discussion at a Nov. 6 meeting of the district council which represents locals in the Detroit area. Some unionists profess to see a connection between the failure to conduct an aggressive Ford drive and the lack of progress in GM negotiations, reasoning that the corporation would be more likely to yield on certain points if its chief competitor were subject to the same regulations. The \$1 special assessment upon all UAW members to finance the Ford campaign has been made payable with the November dues.

The UAW will attempt to enlist the

cooperation of all labor groups for future political campaigns. As a preliminary step, a conference of all labor unions has been called for Dec. 12 to form a nonpartisan labor league for Detroit and lay the groundwork for a State labor nonpartisan league. The meeting was called by Alan Strachan, who was chairman of the UAW Political Action Committee in the recent municipal campaign. All locals in the labor movement of the city are being invited to send representatives to the conference, including independent unions and AFL affiliates as well as the UAW and other CIO organizations.

As an aftermath to the election, the Detroit and Wayne County Federation of Labor is taking steps to expel from its membership those delegates who ignored the federation's recommendations in the election and supported Patrick H. O'Brien and the CIO slate. Action would be directed against rebels who called a second convention to back O'Brien after the federation officially had endorsed Richard W. Reading for mayor, and candidates for council.

An order requiring all publications of union locals to suspend was issued by Homer Martin last week. Instead of individual publications the locals would

be given a page or insert in the international paper, *The United Automobile Worker*. Defying the executive order, *The Conveyor*, weekly publication of the West Side Local in Detroit, went to press this week, its editor Carl Haessler, declaring the Martin's edict would be referred to the local's joint council at a meeting Nov. 13. He said there was some feeling that the censoring of papers by the international was not in accord with the union's constitution.

Hits Worker Attitude

(Continued from page 695)

the greatest number of buyers, and particularly to broaden world markets.

"In plans for the advancement of the industry as a whole, management well knows whether it is treating its men fairly, and I find it ready to welcome constructive suggestions, while the workers don't have to be told whether they are giving a fair return for wages paid.

"Helpful cooperation is needed, and outside influences should guide but not dominate actions of either the worker or management."



Press

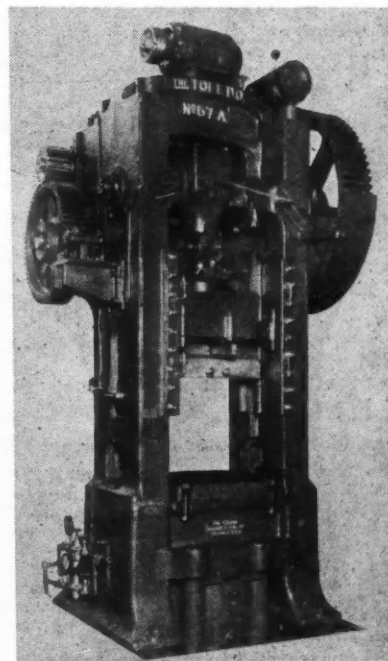
... single action Toledo unit with built-in drawing cushions for double action work.

A new design of its No. 57-A single and double action press has been developed by The Toledo Machine and Tool Co., Toledo, Ohio, a division of E. W. Bliss Co. The press is fitted with a semi-built-in, heavy-duty "Marquette" hydro-pneumatic die cushion. In its high range this cushion gives about double the normal blankholding pressure, adapting the unit to shape-stretching jobs requiring a very high gripping pressure around the edge of the blank.

The new unit shown in the accompanying illustration is a double geared, single end drive, single action press with a gear ratio of 16 to 1 which gives a speed of 22 strokes per minute. The 10 hp., 1200 r.p.m. high-slip motor drives the flywheel by means of V-belts. Electric push buttons control the multiple disc air operated friction clutch, making it possible to inch, run, or stop the press.

All main bearings are bronze bushed and are lubricated by means of the manifold type one shot system. Some of the more important dimensions are: stroke, 10 in.—adjustable for 4 in.; shutheight, stroke down, adjustment

up, bed to slide, 20 in.; bolster thickness 4 in.; crankshaft, 6½ in. at bearings and 9¼ in. at the pins; bed area, 32 in. by 32 in.



Toledo No. 57-A single and double action press.

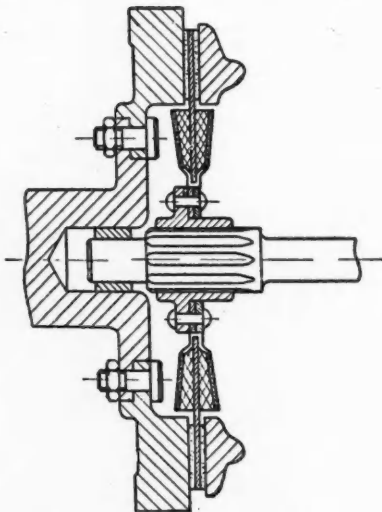


AUTOMOTIVE ABSTRACTS

Rubber Replaces Springs

Improvements in methods of vulcanizing rubber to steel and other metals have made possible many new mechanical applications of the material. One of the latest in the automotive field is in the Couploflex clutch, a French invention, of which a sectional view is shown herewith. Here rubber takes the place of the usual cushion springs and damping discs in the driven member of an automotive-type friction clutch. The driven disc of the clutch has a rubber ring vulcanized to each side of it near its inner circumference, and these rubber rings in turn are vulcanized to two annular discs whose inner portions lie close together and are riveted to the clutch hub while their outer portions are spread apart. As in other similar applications, the thickness of the rubber rings increases with the distance from the axis of the clutch because the distance the rubber has to stretch increases with the radius.

It is proposed also to make "constant-velocity" universal joints by utilizing the elasticity and the vulcanizing properties of rubber. Such joints are needed particularly for front-wheel drives. It is proposed to use a conventional Hooke's joint in the steering knuckle concentric with the knuckle pin and one of the rubber-type joints at the differential. This latter joint consists of two concentric metal drums, one approximately one-half the diameter of the other. Between these two drums there is an annulus of rubber which is vulcanized to both of them. The width of the rubber annulus is greatest at the vulcanized joints with the two drums and less in between.—*Le Technique Moderne*, Oct. 1.



Section of Couploflex clutch

Transient Phenomena in Linear Flow

Sudden changes of pressure and velocity in a liquid column often exert an important influence on the operation of engineering devices and have to be taken into consideration in their design. Examples of such phenomena are the injection process in Diesel engines and water hammer in hydraulic conduits. To this class of phenomena also belong, in a broader sense, surges of mechanical springs, surges in gas columns, and even transient phenomena in electrical circuits.

A paper by Prof. Kalman J. DeJuhász on "Graphical Analysis of Transient Phenomena in Linear Flow" deals comprehensively with such phenomena by means of graphical analysis. Four variables enter into an analysis of these phenomena, namely, the time t , the location x in the liquid column, the velocity v and the pressure p at any point x in the system as a function of the time t . The problem can be briefly stated as follows: The dimensions of the hydraulic system, its initial condition of equilibrium, and the characteristics of the disturbance as a function of the time t being known, determine the response of the system as represented by the values of velocity v and pressure p at any point x of the system as a function of the time t .

The human mind is incapable of visualizing a four-variable function, hence previous analyses made use of equations and computations and did not furnish a mental picture of the interrelated changes. In the paper under review these phenomena are dealt with as a pair of three-dimensional functions, namely:

$$v = f_1(t, x) \text{ and } p = f_2(t, x),$$

each of which can be represented by a stereogram with the v or p values erected as vertical ordinates over the t - x plane as base. The problem then resolves itself into obtaining the data from which this pair of stereograms can be constructed. This is made possible by two interrelationships, as follows:

(1) The relation between the time and the location of the disturbance front can be represented by the t - x diagram by a straight line having the slope

$$\frac{dx}{dt} = \tan(\pm\phi) = \pm a,$$

a being the velocity of propagation in the liquid.

(2) The relationship between the velocity change and the corresponding pressure change can be represented in the v - p diagram by straight lines with the constant slope.

$$\frac{dp}{dv} = \tan \pm \alpha = \pm \frac{\kappa}{a},$$

κ being the elastic constant of the liquid. The paper contains the full derivation of the formulas and procedures used in the graphical analysis and ends with a very extensive bibliography on water hammer, fuel injection, and surges in gas columns and in mechanical springs.—*Journal of the Franklin Institute*, Nos. 4, 5 and 6 of Vol. 223 (April, May and June, 1937).

Growth in Use of Freight Containers

Containers, by which goods can be transferred from road to rail vehicles without unloading have grown in popularity in Great Britain, as may be judged from the fact that the number in service in the country increased from 1574 in 1928 to 13,000 this year. The most popular size is the 4-ton, which measures 14 ft. by 6 ft. 6 in. by 6 ft. 8 in. A smaller size rated 2½ tons is used for the transportation of groceries, paper, boots and shoes, and even for bricks and slates. Both of these sizes are covered. Among containers of the open type are those of 3-ton rating, which are used for the transportation of stoves, grates and bottles, and there is also an open type of 4-ton rating which is used for castings, asbestos sheet, and storage batteries.

A recent development is a 4-ton heat-insulated container which is used for the transportation of frozen meat, fish, and other foodstuffs. An ingenious development is a bicycle container which carries 76 machines in two tiers. Each cycle fits into felted wheel slots and is separated from the adjacent

one by felted cross bars. Household furniture is carried in a similar way, but the most unusual type is that specially built for the conveyance of dry ice. This is insulated with a 10-in. layer of cork, and loading and unloading is performed through a hatchway in the roof.—*Engineering*, Oct. 22.

UAW Wins at Northrop

The National Labor Relations Board has announced recognition of the local UAW union as the exclusive collective bargaining representative of employees in the Segundo, California, plant of the Northrop Corporation, manufacturers of military aircraft and airplane parts. An election, involving the UAW and the Aircraft Workers' Union, was conducted Aug. 3 following a protest filed by the CIO affiliate.

New Bender Models

The Bender Body Co. has developed two new trailer models, featuring improvements in connection with heating and cooking units, shelf and cove space, and a medicine cabinet. Air conditioning will be available on one model.



The WPA, with the aid of the FERA and CWA, has issued an illustrated booklet entitled "America Spreads Her Wings," outlining the progress of recent years in the construction of airports.

Norton Co. has issued a bulletin on its D 86 crankpin grinder.*

The National Highway Users Conference has compiled a statistical booklet on "Highway User Taxes".*

A revised survey of the laws concerning use of house trailers has been published by the National Highway Users Conference.*

Farrel-Birmingham Co., Inc., has issued another of its series of studies of the industrial situation. It is entitled "The Peril of Wage and Hour Legislation".*

The Trane Co. has issued a folder illustrating and describing some unusual uses for its heating and air conditioning equipment.*

A newly revised edition of 352-page catalog No. 26 by the Benjamin Electric Mfg. Co., giving complete data on recent plant lighting developments as well as showing the products, is available.*

The Mine Safety Appliances Co. has recently issued a new booklet entitled "Pertinent Questions and Answers Concerning Dusts".*

A new illustrated booklet, Electrolimit Mill Gages, has been issued by the Pratt & Whitney division, Niles-Bement-Pond Co. It is entitled "Controlled Strip Thickness".*

Industrial Gloves Co. has issued a new catalog of its safety apparel items for plant use.*

General Electric Co. has made available its booklet "We and Our Highways".*

The hoist and body division of Gar Wood Industries, Inc., has issued two illustrated bulletins, No. 2 and No. 3, describing respectively heavy-duty cam and roller hoists and heavy-duty dump bodies.*

The Flexrock Co. has issued a folder on its Ruggedwear Resurfacer and other products.*

Skilsaw, Inc., manufacturer of portable electric tools, has published a new general catalog.*

Haynes Stellite Co. has published a booklet entitled "The Haynes Stellite Library," which lists and describes 18 books, reprints and folders heretofore issued.*

A folder entitled "Planned Materials Handling Systems" has been issued by the Cleveland Crane & Engineering Co.*

The American Iron & Steel Institute has issued section 2 of its bulletin the "Steel Products Manual," defining and describing steel products.

A complete revision of the "Timken Engineering Journal" has been completed. It is a 294-page loose-leaf volume containing bearing specifications and use data.*

The Timken Roller Bearing Co. has issued a handbook on seamless tubing giving standard weights, wall thicknesses, conversion tables and other data.*

The Independent Air Filter Co. has published a bulletin which describes the company's double-duty, automatic, non-clogging air filter.*

Description of the 1938 Servi-cycle is available in a leaflet issued by the Simplex Mfg. Co., the producer.*

* Obtainable from editorial department, AUTOMOTIVE INDUSTRIES. Address Chestnut and 56th Sts., Philadelphia.

MEMA Index Rises

Grand index of the Motor and Equipment Manufacturers Association in September rose to 149 from 141 in August, against 114 a year earlier. The comparison is against January, 1925, as 100. Original equipment shipments to vehicle manufacturers rose to 149 from 140 against 108 a year earlier. Service parts shipments to wholesalers were steady at 164 in September against August, compared with 153 in September, 1936. Accessories shipments to wholesalers went to 128 from 118 in August, against 98 a year earlier. Service equipment shipments to wholesalers rose to 148 from 131 compared with 105 in September last year.

Acheson Colloids

Acheson Colloids Corp., Port Huron, Mich., points out that the words "dag" as well as "Oildag," "Aquadag," "Glydag," "Castordag," "Varnodag," and "Prodag," are trademarks and not generic terms. These names represent their brands of colloidal products in various mediums, and as such are protected by and subject to the usual trademark laws.

Rim Inspections

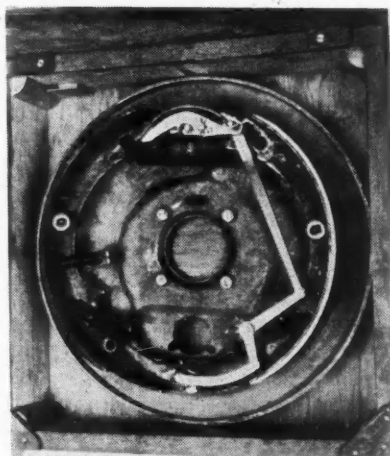
October rim inspections by the Tire & Rim Association, Inc., showed the bulk of the shipments to be in the 16 by 4.00E group, which were inspected in the total of 936,390. The next largest group was the 16 by 4.50E, numbering 335,605. Bulk of the truck rims inspected were in the 20 in. group, numbering 188,336.

Letters

to AUTOMOTIVE INDUSTRIES

Automatic Brake Adjuster Compensated for Drum Expansion

Tests made by the Thermo Brakes Corp., for a year or more, have demonstrated that automatic adjustment of the Bendix type of hydraulic brake is entirely practicable at very moderate cost. Automatic adjustment is not new by any means, and railway brakes have had "slack adjusters" for many years. However, the internal type of automobile brake has presented a peculiar problem which had to be worked out before a "slack adjuster" could be successfully applied to it.



TEMPERATURE-controlled adjuster for Bendix brake through an automatic device.

As every engineer knows, brake drums when heated expand and become larger in diameter. This expansion increases the running clearance, and the ordinary type of slack adjuster, having no intelligence of its own, not knowing that the increased clearance is a temporary one, not produced by a wearing down of the brake lining, proceeds to adjust the brake to follow up this expansion. This results—when the brake is cooled off—in a dragging brake with little or no running clearance.

To prevent this over-adjustment it is necessary to introduce an element in the slack adjuster which will slow down and completely interrupt the adjusting function

at times when the brake drum becomes hot from excessive or severe braking action. This is done by the introduction of lost motion into the pawl-operating mechanism to an extent proportional to the difference in temperature between the brake drum and its brakes.

To produce the required lost motion, a commercial thermostatic bi-metal was used, which will maintain its thermo-flexing characteristics for the high temperatures to which it is subjected. This bi-metal piece is placed in close proximity to the braking surface of the drum with its fixed end secured to the ratchet lever and its free end hooked over the end of the anchor pin. This link in its upward stroke, rotates the ratchet lever at once if parts are cold, but when heated, it moves upward freely in an elongated slot in the ratchet lever until it contacts the free end of the bi-metal spring, which has bent upward as a result of the heat. Thereafter any further movement of the link will rotate the ratchet lever.

Exhaustive tests of this mechanism have been conducted to prove that it will not over-adjust under any conditions. The photo shows the design. It can be applied to many of the Bendix model brakes with no change in the shoes other than the drilling of one hole in the primary shoe.

GEORGE L. SMITH,
Washington, D. C.

Airline Traffic Gains

The 17 scheduled airlines operating in the continental United States carried 130,296 passengers and 720,479 lb. of express in September against 123,550 passengers and 618,113 lb. of express in August, and against 101,239 passengers and 652,930 lb. of express in September, 1936. The lines used 65.17 per cent of their seats in September, against 62.44 in August and 70.43 per cent a year earlier.

Reconditioned Engines

The Ford Motor Company will complete some time in November its millionth reconditioned engine, rebuilt to new engine specifications. The engine exchange plan, forerunner of the Ford exchange plan which now includes other engine and chassis parts, was introduced in April, 1932. The plan was intended to eliminate the expense and inconvenience attached to motor overhauls and to provide replacements capable of giving a larger measure of additional service.

Lincoln Tunnel Opens Dec. 22

New York City soon will be connected to Weehawken, N. J., by mid-town tunnel. The first, or south tube, of the Lincoln Tunnel, now receiving its finishing touches, will provide another new link connecting Manhattan with the mainland. The dedication exercises will take place on Tuesday, December 21. The tunnel will open for traffic Dec. 22.

Calendar of Coming Events

DOMESTIC SHOWS

Brooklyn Automobile Show.....Nov. 6-13
Chicago Automobile Show.....Nov. 6-13
Columbus Automobile Show.....Nov. 6-12
Omaha Automobile Show.....Nov. 6-11
Detroit Automobile Show.....Nov. 6-13
Motor Truck Show, 4th Annual,
Newark, N. J.....Nov. 6-12
Newark, N. J., Truck Show.....Nov. 6-12
Buffalo, N. Y., Automobile Show.....Nov. 6-13
Indianapolis, Automobile Show.....Nov. 11-20
Newark, N. J., Automobile Show.....Nov. 6-13
Philadelphia Automobile Show.....Nov. 6-13
Pittsburgh, Pa., Automobile Show.....Nov. 6-13
Jersey City, N. J., Automobile Show,
Nov. 8-13
Tri-State Automobile Show, Memphis,
Tenn.....Nov. 8-13
Baltimore, Md., Automobile Show,
Nov. 13-20
Cleveland, Ohio, Automobile Show,
Nov. 13-20

Rochester, Automobile Show.....Nov. 13-20
Springfield, Mass., Automobile Show,
Nov. 14-20
St. Louis, Mo., Automobile Show.....Nov. 14-21
Portland, Ore., Automobile Show.....Nov. 14-21
Denver, Colo., Automobile Show,
Nov. 15-20
Milwaukee, Wis., Automobile Show,
Nov. 17-24
Kansas City, Mo., Automobile Show,
Nov. 27-Dec. 4
A.S.I. Show, Navy Pier, Chicago,
Dec. 6-Dec. 11

FOREIGN SHOWS

Great Britain, 13th International
Commercial Automobile Exposition
(trucks and buses), London.....Nov. 4-13
Toronto, Ont., Automobile Show.....Nov. 6-13
Great Britain, 36th Scottish Inter-
national Automobile Exposition,
Glasgow.....Nov. 12-20

Montreal, Que., Automobile Show,
Nov. 20-27
Peru, Automobile Show, Lima,
Dec. 23-Jan. 6, 1938

CONVENTIONS AND MEETINGS

American Automobile Assoc., Annual
Convention, New York.....Nov. 19-20
American Standards Association, An-
nual Meeting, New York City.....Dec. 1
American Society of Mechanical En-
gineers, New York.....Dec. 6-10
SAE National Production Meeting,
Flint, Mich.....Dec. 8-10
SAE Annual Meeting, Detroit,
Jan. 10-14, 1938
American Road Builders' Association,
Cleveland.....Jan. 17-21, 1938
American Society for Testing Mate-
rials, Spring Regional meeting,
Rochester, N. Y.....Mar. 7, 1938



It Takes Dollars to Cheat

By PAUL G. HOFFMAN*

AS we approach a new year it seems wise to appraise the results in the past 18 months of expanded safety activity on the part of the automotive industry to determine whether the expenditures we have made and those we anticipate making are worthwhile.

As we have gone forward with the safety work we have been increasingly impressed with the complexities of the problem. The catch phrases of the safety movement have taken on new significance. The famous 3E's of the National Safety Council—Education, Enforcement, and Engineering, have implications of proportions that are rather staggering.

Education involves instruction of all school children in primary grades on how to walk safely, of high school and college students on how to drive safely and re-education of our entire adult population on how to drive and walk safely.

Enforcement covers legislation to set up and empower the enforcement agen-

cies, the training of thousands of men in the new profession of modern, selective enforcement, and a revamping and standardization of our entire traffic court procedure.

Engineering involves both the building of new safe highways, the modernization of our present trunk line of highways, the building of express highways within our cities and minor improvements in all highways to design out, as far as possible, existing accident hazards.

The activities requiring the most safety effort roughly divide themselves into two classifications, those which involve much time and great sums, and secondly, those about which something could be done quickly.

The modernization of our highway system, the building of elevated highways or motor subways in cities, are huge undertakings but they must be accomplished if we are to reach our objective of safe travel.

We have today approximately 1000 miles of advanced design highway in America where we have divided lanes and grade separations. We need 100,000 miles of such highway. We need improvement in our secondary roads as well. Frank Sheets, president of the

Portland Cement Association, estimates the job would cost approximately 50 billion dollars. It will take 25 years to complete—but here's the important point—it can be paid for out of revenues from present motor taxes within 43 years. No estimate has been made of the cost of modernizing our city street system in our larger metropolises but it will involve billions at least.

But here again it is economically sound. Fortunately we have in Thomas H. MacDonald, chief of the U. S. Bureau of Public Roads, and in the commission of highway engineers, a group of men who know how the job should be done, who are eager to do it, and who will proceed as rapidly as funds are supplied.

The second group of activities include education, enforcement and traffic engineering. Even here we enter into large figures of cost but we at least get out of the stratosphere. No estimate of the total cost has been undertaken but reliable authorities inform me that as far as the States are concerned, we could have adequate State enforcement, State traffic engineering and a considerable amount of public education at a cost of approximately

(Turn to page 724, please)

*From an address at the Automotive Safety Foundation Luncheon in New York, October 29, 1937.



Photos by Solbelman, Acme, and
Photographic Illustrations, Inc.

t Death

The Three E's Program

of the Automotive Safety Foundation has been forwarded through the agency of other national organizations well equipped to carry out the work

ENGINEERING safety into the building of new highways and modernization of present roads.

EDUICATION of the school children in the primary grades on how to walk safely and of high school age on how to drive safely.

ENFORCEMENT covering legislation, the training of enforcement officers and revamping traffic court procedure.



Bendix Automatic

Clutch Control is

New on 1938 Cars

THE automatic clutch-control mechanism supplied by Bendix Products Corp. and featured on a number of 1938 passenger cars in combination with power-shift for the transmission, is entirely new both in design and in operation.

The power cylinder is of the internal-valve type and operates on much the same principle as the internal-valve type of power brake unit. The power cylinder connects to the clutch throw-out lever by means of a bellcrank and clutch throw-out link. The internal valve of the cylinder connects to the accelerator pedal through the valve lever, its attached cam, and the accelerator threaded-sleeve rod.

As on previous models, the automatic clutch operates only when the engine is running; therefore, when starting the car, it is necessary to depress the clutch pedal. When the ignition switch is turned on, the circuit through the automatic clutch solenoid is completed and the solenoid valve is opened, which establishes direct communication between the intake manifold and the forward end of the automatic-clutch power cylinder. With the starting of the engine, the vacuum created within the forward end of the power cylinder completely disengages the clutch and holds it in the disengaged position.

Upon engagement of the clutch, the first movement of the accelerator pedal is transmitted directly to the cam at the lower end of the valve lever through the accelerator threaded-sleeve rod. As the accelerator pedal is depressed and the cam moves forward, the upper end of the valve lever and attached valve rod move rearward,

since the valve lever is connected to the bellcrank at a point just above its center. With the valve rod moving rearward, the piston-rod ports connecting the two sides of the piston are uncovered, and air is withdrawn from the rear side of the piston as there is a vacuum on the forward side and the pressures on opposite sides of the piston tend to equalize. The reduction of pressure on its rear side causes the piston to move rearward on its engaging stroke. As the piston and piston rod move rearward faster than the valve rod, the piston-rod ports overtake the valve plunger and seal off the vacuum ports. This "follow-up" action continues throughout the engaging stroke and provides very smooth clutch engagement. If pressure on the accelerator pedal is not maintained, the piston-rod ports will overtake the valve plunger, and the internal valve comes to its "lap" position, thereby checking further piston-rod movement. With the valve in its "lap" position, the piston-rod ports are sealed, so that air can neither enter nor escape from the rearward side of the piston.

During normal throttle operation, the automatic clutch solenoid remains energized and vacuum is maintained in the forward end of the cylinder. At the start of the engaging stroke, there is a vacuum only on the forward side of the piston, the rearward side being at atmospheric pressure. As the clutch approaches the engaged position, a balancing action takes place, tending to suspend the piston in vacuum; however, as soon as the shift to high gear is completed, or the throttle is opened more than 60-75 deg. as in making a wide-open-throttle start, the solenoid

is de-energized. This closes the vacuum port and opens the atmospheric port, thereby admitting air to the forward end of the cylinder and causing the clutch to engage quite rapidly. With the opening of the atmospheric port, the vacuum in the power cylinder is destroyed and the piston becomes atmosphere suspended.

In order that the clutch may be brought up to its initial engaging point with the least possible delay, the piston-rod ports are uncovered to a greater extent than after the clutch has reached its initial engaging point. This is accomplished by the use of the spring-loaded cam at the lower end of the valve lever. When the power-cylinder piston has traveled to the point of initial clutch engagement (the "cushion point") rapid movement of the valve ceases. Any further movement of the valve after the cam is in contact with the "cushion-point" stop screw, takes place only as the cam is rotated about its center and the distance between the cam center and the stop screw is reduced. A very finely graduated movement of the valve is then provided to cushion-in the clutch.

At the point where the cam comes in contact with the cushion-point stop screw, the lost motion clearance in the throttle linkage has also been taken up, so that as the clutch comes into engagement, the throttle begins to open. After the clutch has been partially engaged, the cam angle changes quite abruptly, permitting the clutch to complete its engaging cycle quite rapidly.

Operation of Valve Lever and Cam

Since the operation of the internal-valve mechanism is so vital to the satisfactory operation of the automatic-clutch control, a careful study of this mechanism is advisable. The cam is pivoted to the valve lever at its lower end, and is spring-loaded to hold it away from the cushion-point stop screw. The spring tension is sufficient to cause the cam and attached valve lever to move as a single unit, as the accelerator pedal is depressed, until the cam comes in contact with the stop screw, when the direct forward movement of the cam and valve lever is checked. From this point on the only valve or valve-lever movement that takes place is that which is permitted by the cam as it rotates about its center from the high to the low side. The cushion-point stop screw is made adjustable to permit changing the point where the cushioning effect takes place.

The valve and valve lever also have another motion, since the bellcrank to which the valve lever is attached begins to move just as soon as the valve ports are uncovered, thereby changing the valve-lever fulcrum. It is this follow-up action which tends to keep closing the valve ports and bring the lever system to rest for any given throttle opening.

Initial and Normal Operation of the Clutch

In order to compensate for the reduction in the friction within the clutch due to the cork inserts becoming covered with oil after the engine has stopped or has been allowed to stand for some time, two rates of clutch engagement are provided by automatically changing the cushion point. Attached to the bellcrank is a two-position compensating lever which is tripped to the initial operating position by the rod link from the clutch throw-out to the bellcrank. The compensating lever is tripped to the opposite position by a lever attached to the bellcrank which comes in contact with a lug on the piston rod end fitting. The compensating lever is rigidly fastened to the valve-lever pivot shaft, and as the com-

pensating lever is tripped to the initial operating position, the effect is the same as lengthening the piston rod. The pivot shaft is eccentric at the end that passes through the valve lever, which changes the valve-lever fulcrum point.

When the clutch pedal is depressed upon starting the car, the clutch throw-out to bellcrank-rod link trips the compensator lever, changing the fulcrum point of the valve lever and permitting the clutch to engage deeper before the fast movement is checked. This automatically changes the cushion point and prevents excessive slippage, which might otherwise result from the reduction of friction caused by oil on the cork inserts.

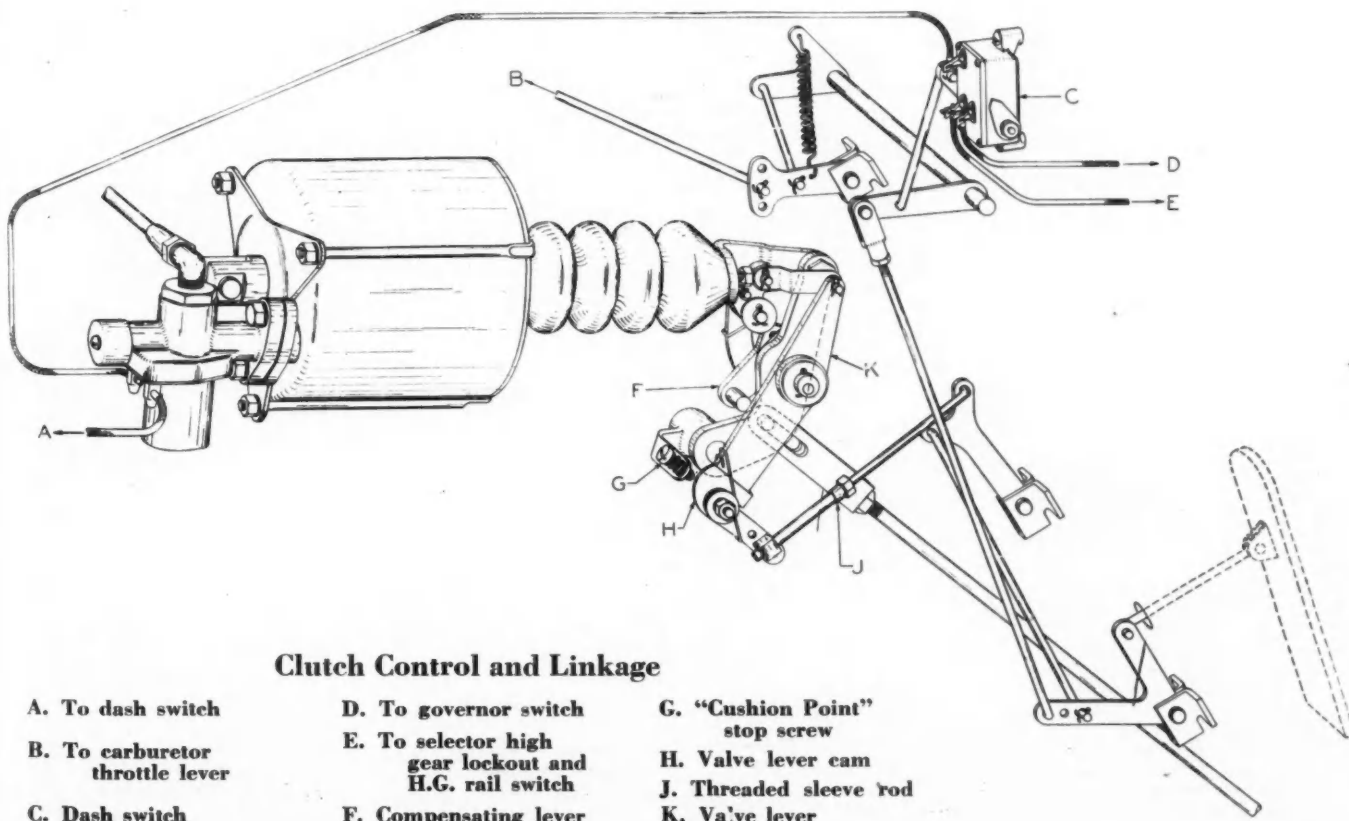
The compensator lever remains in the tripped position until the shift to high gear is completed. At this moment the compensator lever is tripped back to its normal position, and normal clutch operation takes place from this point on until the engine has again been stopped.

The Dash Switch

Other refinements in the operation of the automatic clutch have been made

possible by the introduction of a switch located on the dash and operated from the accelerator linkage. The dash switch insures full clutch engagement and no load on the clutch throw-out bearing when the car is being driven in high gear at speeds below 15 m.p.h., where the throttle is opened from 5 to 10 deg. The dash switch also permits the making of wide-open-throttle starts without causing an undue amount of clutch slippage.

The dash switch contains two sets of breaker points, which are both operated from the same lever. When the lever is in the closed-throttle position, both sets of breaker points are closed, and the solenoid circuit is completed either through the RW wire and governor switch to ground, or through the Y wire selector switch and rail switch to ground. With the throttle opened from 5 to 10 deg., the circuit to ground through the RW wire and governor switch is broken, but the circuit through the dash switch to the Y wire is still closed, which provides a path to ground either through the high-gear lock-out switch of the selector assembly, or through the high-gear transmission-rail switch, except when the transmission and finger tip control



Clutch Control and Linkage

- | | | |
|---------------------------------|---|-------------------------------|
| A. To dash switch | D. To governor switch | G. "Cushion Point" stop screw |
| B. To carburetor throttle lever | E. To selector high gear lockout and H.G. rail switch | H. Valve lever cam |
| C. Dash switch | F. Compensating lever | J. Threaded sleeve rod |
| | | K. Valve lever |

are in the high-gear position.

When the accelerator pedal is depressed to the point of opening the throttle from 60 to 75 deg., as in making an open-throttle start, the second set of breaker points of the dash switch are separated, breaking the circuit to

ground through the Y wire circuit and de-energizing the solenoid valve. When the circuit through the solenoid to ground is broken, the vacuum port closes and the atmospheric port opens, permitting air at atmospheric pressure to enter the forward end of the power

cylinder to speed up the rate of clutch engagement.

The governor switch functions the same as on the 1937 models to prevent automatic clutch operation when the car runs at more than 15 to 20 m.p.h. and the throttle is closed.

Electric Hand Revisions

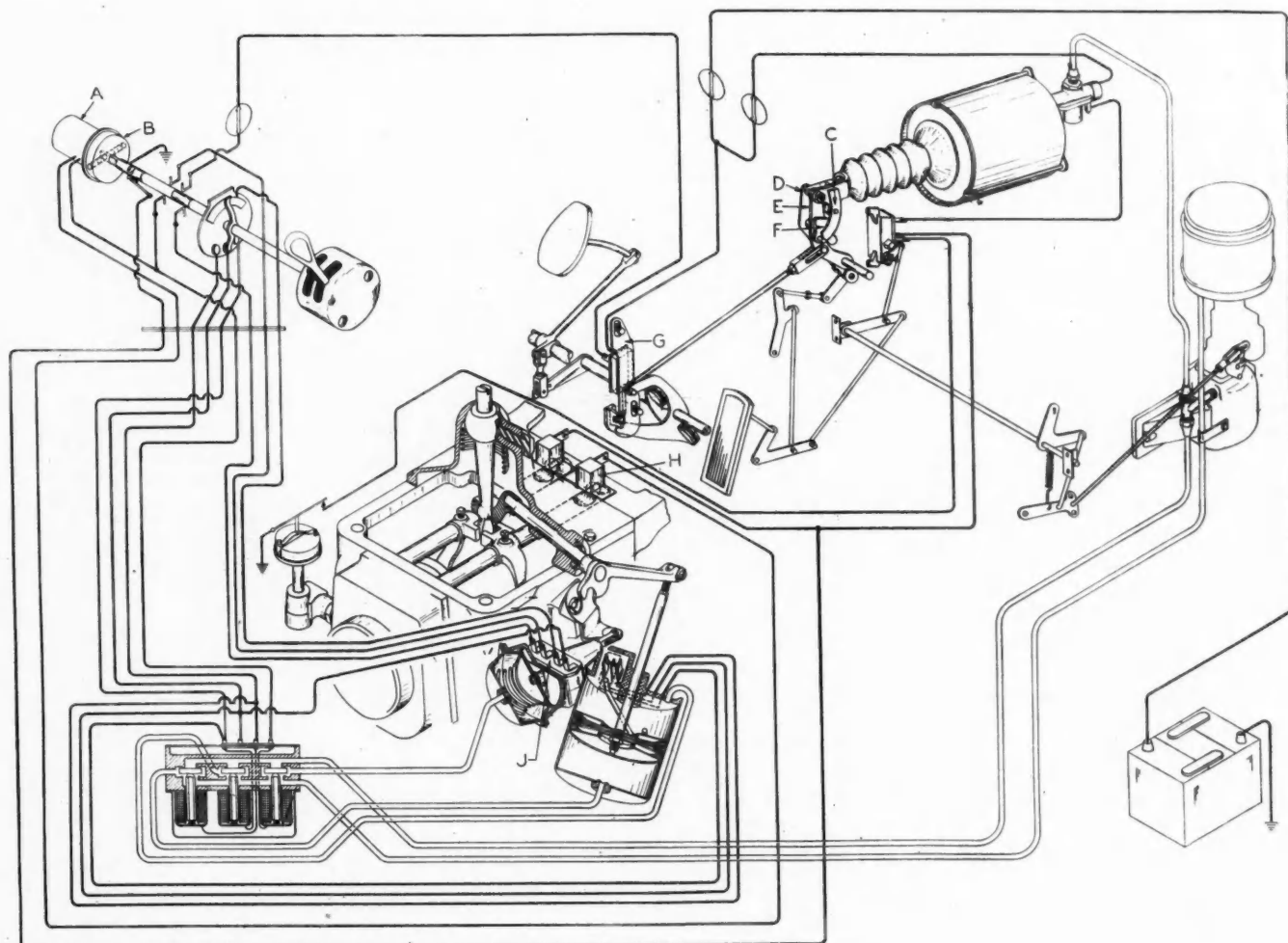
FOR 1938 the Electric Hand has been refined somewhat in design, the chief refinement being that it is now provided with a tooth-abutment indicator to insure complete engagement of the low-reverse gears before engagement of the clutch takes place. The tooth-abutment indicator takes the form of a kick-out device which moves the finger-tip lever back toward neutral position from either low or reverse, when released, if the shift to low or reverse gear has not been completed within the transmission. This

has been accomplished by the addition of a solenoid and detent-rotor assembly to the selector assembly, the addition of a low-reverse shift rail switch, and a change in the finger-tip-control shaft.

The finger-tip-control shaft has been made longer, with the extension flattened where it passes through the detent-rotor assembly. The rotor contains two spring-loaded plungers at right angles to the shaft which holds the rotor to the control shaft under spring tension. When the solenoid is energized, the detent rotor is held

against the face of the solenoid, the detents preventing rotation of the rotor with the shaft. If the finger control is then moved into either the low- or the reverse-gear position, the springs of the rotor are compressed, and then tend to hold the shaft in the neutral position. There is sufficient load on the springs to kick the finger-tip-control lever back into neutral position, indicating that the shift has not been completed within the transmission. If, however, the shift has been completed

(Turn to page 726, please)



Transmission and Clutch Control

A. Tooth abutment indicator solenoid
B. Detent rotor

C. Compensating lever trip
D. Valve lever
E. Bell crank

F. Compensating lever
G. Self-adjusting circuit breaker switch

H. Low-reverse rail switch
J. Interlock switch

Just Among Ourselves

Sampling the New Models

AT the New York and Chicago automobile shows (particularly) the usual number of factory executives and a considerable number of sub-executive "spotters" moved about among the crowds, gathering for comparison the rosebuds and spinach which Mr. and Mrs. Public handed verbally to the new models. This is an annual and sanctified custom, very heart-warming to those sales execs whose product gets sweet reception; a little tough on those whose maying baskets are filled with broccoli.

To a friend of ours whose business is making market surveys, the whole thing seems a little tragic. It is entirely unnecessary, says he, for executives to be on the anxious bench at show time about the reception their new models are going to get.

The technique is this: When new styling is evolved, public's feeling about it can be scientifically pre-tested with a survey which doesn't have to be terrific in size, or cost much, or reveal who is behind it. If a new design is sour, a factory can know what proportion of the population is likely to think so in a month or less after the design is evolved, and long before it needs to go into production.

The same technique can be tried several times until the right answer is found, and, according to our informant, public reaction to a sampling survey, if the survey is handled right, will correlate remarkably with

public acceptance of the product as it is finally put on the market.

There's nothing essentially new in all this. General Motors, through its Customer Research Staff, has been pushing in this direction through many channels. But, so far as we know, the idea has never been specifically adapted to the problem of saving money—big money—on new model mistakes in advance. It's an interesting possibility and we'll be glad to intermeditate between anyone who is interested and our prognosticating friend.

Makers Have Changed Their Price Classes

AUTOMOBILE prices continue to be a football for discussion in most of the places where the industry and its problems are shop talk. There is a considerable segment of opinion which believes there will have to be some readjustment of the price schedule downward after the selling season runs its early courses. There is another group which believes that the present price scale will make very little difference in the number of cars sold during the model year. This latter point we are willing to accept with some minor reservations, but available figures, as contrasted with available opinions do foreshadow some interesting developments which will be worth watching.

On page 718 of this issue we print a listing of all makes and models of cars being made for the present market, arranged in

the exact order of the delivered-in-Detroit (or other point of origin) price. A similar list was printed last year (Nov. 21 issue) on an f.o.b. basis. Direct comparisons are, of course, nearly impossible between the two lists, but some trends are extremely marked.

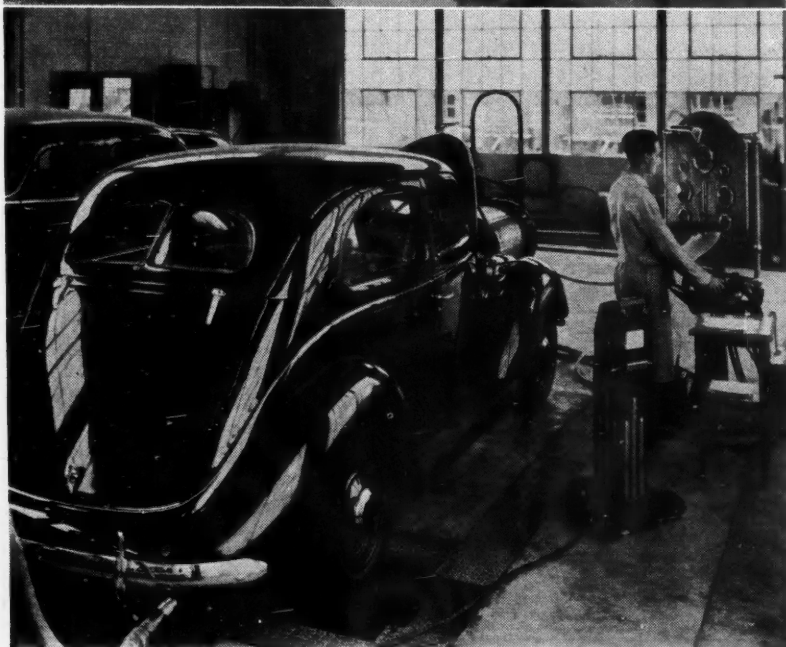
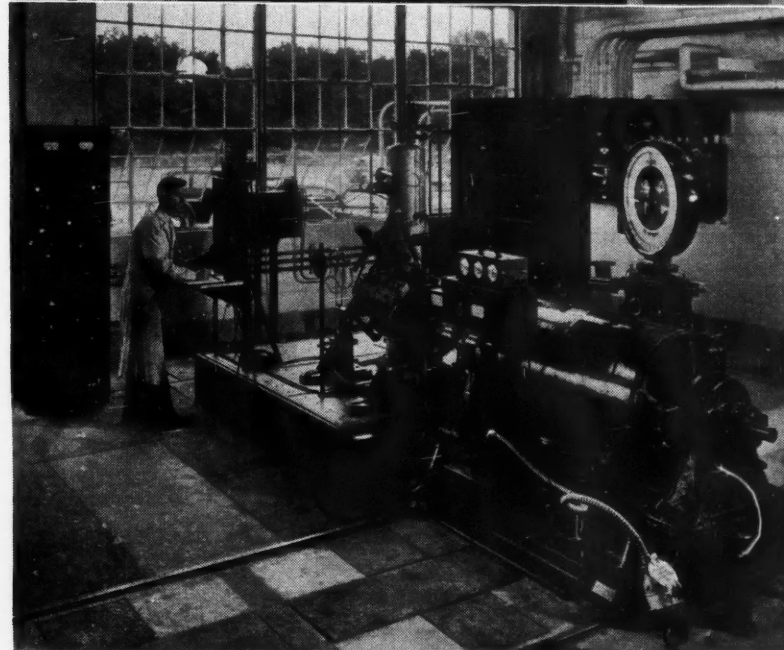
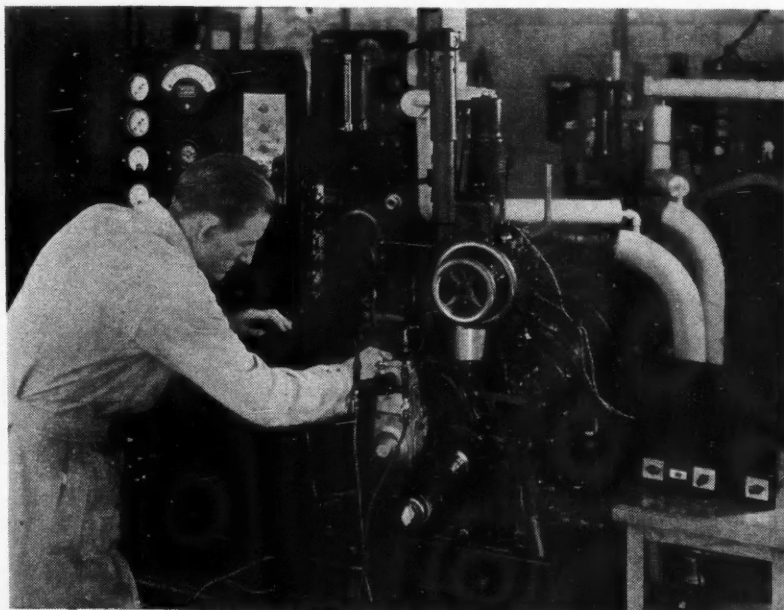
There is a considerable shift in the number of car types available in the \$500 to \$749 group to the next higher group. An even larger shift upward distinguishes the next group.

Chevrolet, Ford, Plymouth and Willys are now the only manufacturers offering a selection of types in the \$500 to \$749 delivered-price group. September registration figures (see page 696) show a decided shift to this price class, more than significant when it is remembered that most of the preliminary price increases were already in effect, or expected, during September. We're not trying to build a bridge out of two straws. But we do submit that the present price scale may produce some profound movements competitively within the industry. The one phrase we heard oftenest during the New York show was "he's out of his price class."

France Frowns on American Cars?

FROM the National Foreign Trade Council's meeting in Cleveland, which programmed little of direct automotive interest, come persistent reports that France is looking coldly at American automobile imports. Irritatingly vague in content, the rumors say that the attack on American cars will take the form of higher import duties and internal revenue taxes higher than any yet levied. It doesn't make sense to us, but a lot of people at the Foreign Trade Council meeting apparently thought it worth gossiping about.

—H. H.



New Gulf

By JOSEPH GESCHELIN

WITH the completion of a great expansion program in its laboratory facilities, the Gulf Research and Development Co., which serves the marketing organization of the Gulf Oil Co., may well boast of having one of the most comprehensive centralized petroleum research plants in this country. In scope, it comprehends the entire picture from the exploration and discovery of oil deposits to the development of commercial production process and the improvement of the final products by constant testing in commercial equipment.

The new laboratories, under the guiding influence of Dr. Paul D. Foote, vice-president, are located at Harmarville, Pa., a suburban district about 15 miles northeast of Pittsburgh. The property is a level tract of some 47 acres situated on a plateau rising

(Top) Instrumentation on the high turbulence compression ignition engine. Magnetic time-of-ignition pickup can be seen in the top of the combustion chamber and connected to its controls and amplifier mounted on the table.

(Center) One of the engine beds with engine in place and 150 hp. electric dynamometer connected. Dynamometer and engine controls are shown to the left, the automatic fuel weigher back near the window and automatically operated engine cooling tank in the rear center of the picture. In the foreground can be seen the method of mounting on rails and the alignment plate. The three instruments in the case on the dynamometer pedestal are a tachometer, electric stop clock and revolution counter with electric clutch. The clock and counter work in conjunction with and are operated by the automatic fuel weigher.

(Bottom) Bendix Chassis Dynamometer showing instrumentation and controls.

If **Laboratory Has Facilities**

for far-reaching service to owners and manufacturers of automobiles using either gasoline or Diesel engines.

about 135 ft. above the Allegheny River. Far from the din and vibration of the mighty steel center, the laboratories are in a cloistered spot where scientific study may be carried on without interruption and free from distracting influences.

Perhaps the best impression of the scope of activity may be gained by noting the chief departmental activity taken from the organization chart, as follows: Geophysics, Geology, Physics, Chemistry, Engineering, Materials and Production Chemistry, and Business Management.

The major part of this discussion will center upon the activity of the

engineering division and more particularly on the work of the automotive laboratory.

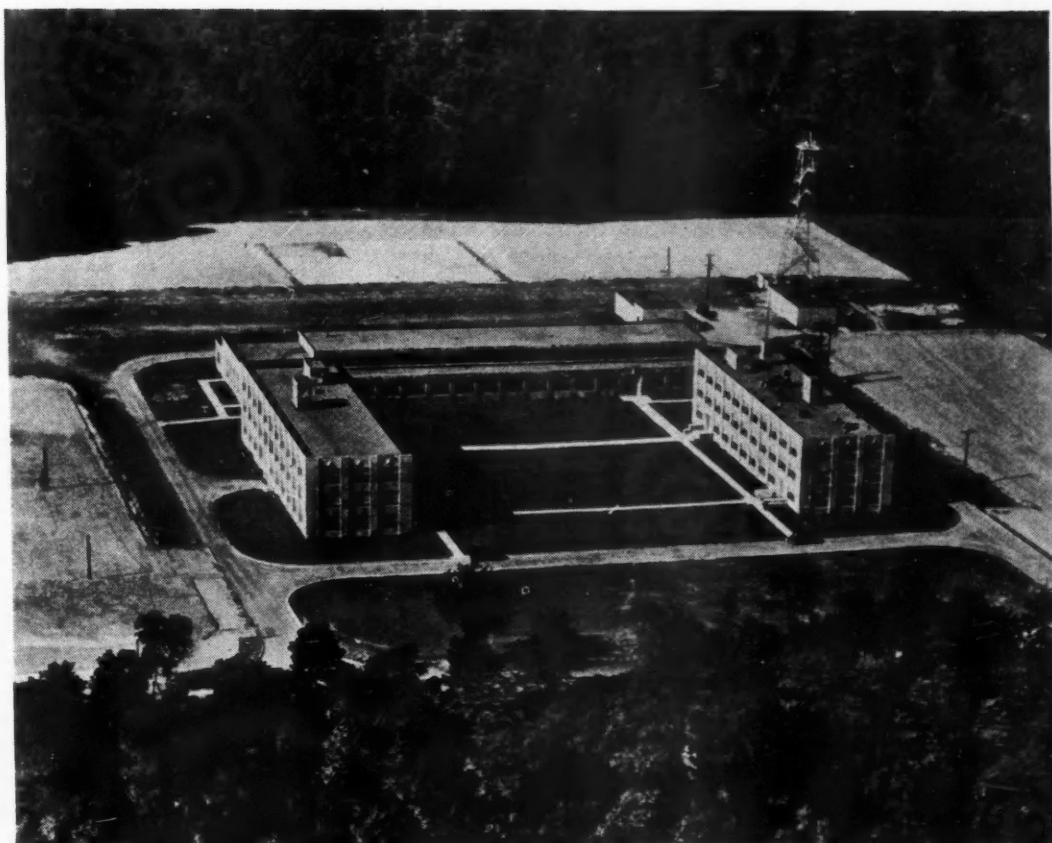
In general, the geophysics department is concerned with the development of methods and instrumentation for oil exploration. Geophysical prospecting uses a crew of from a few to as many as 50 men in a single party, with thousands of dollars worth of scientific equipment, in making elaborate surveys. Consequently, in addition to the staff at Harmarville, the laboratories provide a field force of over 400 people for the prospecting service.

The chemistry and physics departments are concerned with production

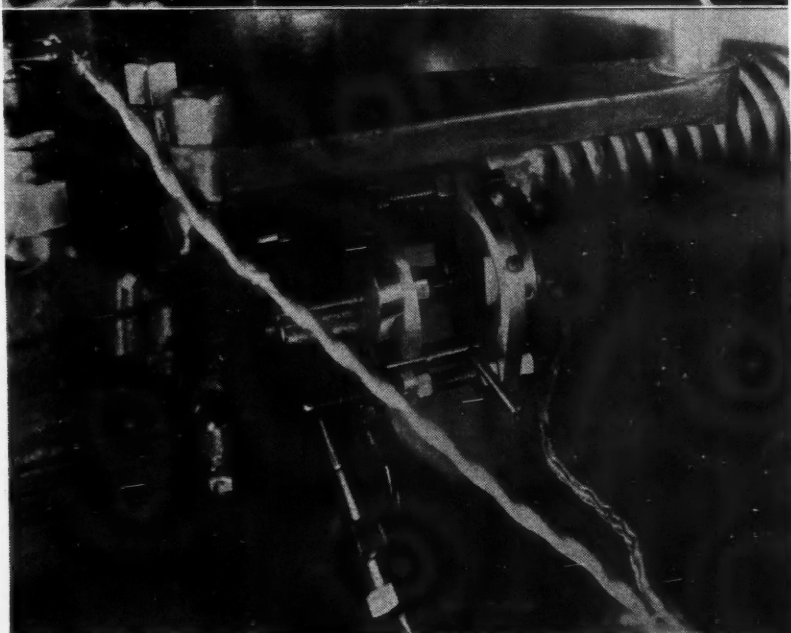
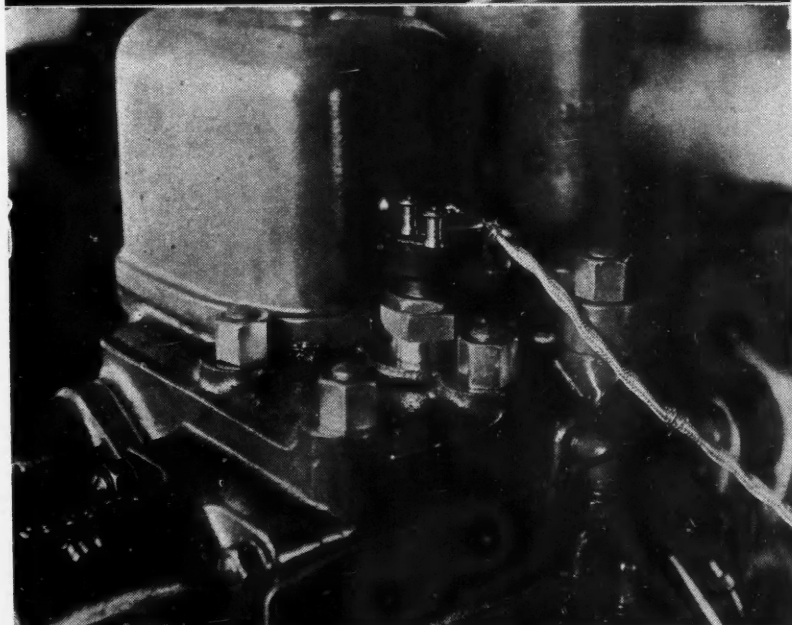
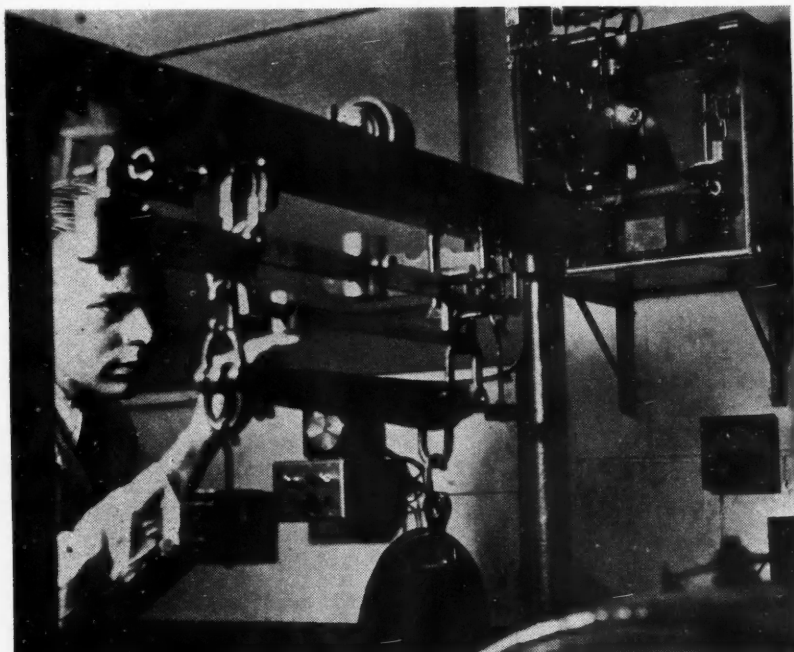
techniques, refinery techniques, chemical engineering, metallurgy, heat treatment, and materials testing.

Chemical engineering carries on its work with the development of pilot refinery equipment which is of sufficient capacity to make small production runs of new products for initial commercial testing and, on occasion, to provide material for a new merchandising program.

Engineering is one of the largest departmental divisions at Harmarville and is directly supervised by R. J. S. Pigott, staff engineer, and A. A. Lane, mechanical engineer. Briefly, its activities embrace the following:



Air view of the Laboratory showing original buildings and experimental oil well and derrick in background.



Instrument design for all departments.

Drafting work for all departments.

Machine shop for producing all instruments and laboratory equipment.

Mechanical testing laboratory with service for all departments.

Full-scale oil well derrick and pumping machinery.

Development of new equipment for oil well drilling.

Automotive laboratories.

The automotive laboratory unit is charged with the responsibility for testing the adaptability of products in commercial automotive equipment, the carrying on of an extensive fundamental research program aiming at improvement in fuels and lubricants, cooperative research projects in knocking, and in Diesel fuels, and finally the road-testing investigations which are made in cooperation with API and SAE committees.

In addition, there is the usual program of trouble-shooting in the interest of the public and the fleet operator, as well as special studies for car manufacturers and engine builders.

C. W. Butler is in charge of this unit, comprising the following sections—lubricants and instruments, fuels and combustion, Diesel studies, and clerical.

This laboratory is entirely new and represents the very latest equipment and testing techniques known to the art. For example, an outstanding feature of the dynamometer set-up is the use of specially designed automatic controls which make it possible to run continuous tests without an operator. This is facilitated by the development of a unique automatic fuel weighing device, weighing the fuel in 1-lb. charges, and automatically counting the number of such cycles for the duration of the run.

Dynamometer beds and other heavy foundations are made up in structural steel filled with concrete. The frame is set on the floor in the proper location, upon a layer of heavy paper which prevents the concrete from adhering

(Top) Cold room dynamometer scale beam with automatic fuel weigher on wall above and thermocouple selector switch (lower right.) Any one of thirty-six thermocouples in engine may be selected for determining temperature at that point.

(Center) Diesel fuel rating unit. Ignition pickup.

(Bottom) Another illustration of the Diesel fuel rating unit. Ignition pickup.

to the floor and makes it possible to move the foundation to some other location later on. Another wrinkle in the design of the dynamometer beds is the elimination of the customary T-slots. Instead, the framework is fitted with a large number of threaded holes, protected by screwed-in set screws which can be readily removed when necessary.

For road testing, there is a fleet of new cars fitted with special fuel tanks, temperature measuring instruments, and other essential equipment. A feature of the equipment is a novel spark position indicator designed by the laboratory. It is said to be more simple than any similar device in use today; it gives instantaneous readings of spark position at any speed for any degree of throttle opening, and is very easily and quickly installed.

The main dynamometer room has four engine-test beds with reserve space for four more. Engine beds are paralleled by tracks on which dynamometers roll with stop blocks at each engine bed, allowing for accurate alignment at any test position. Dynamometer equipment includes one 150-hp., 5000-r.p.m. electric dynamometer, one 1000-hp., 6000-r.p.m. hydraulic dynamometer, and a 200-hp., 6000-r.p.m. Midwest dynamic type. The latter is a new electric absorption, water cooled type machine. The electric dynamometer is connected through engine controls and meters so that loss of oil pressure, engine overheating, loss of load or over-speed will cut out ignition and dynamometer supply, thereby insuring safe operation without constant attention of the operator.

D.C. power for the dynamometer is supplied by a 100-kw. synchronous motor generator set. Under continuous operation tests the dynamometer can be loaded back into the motor generator set, thus conserving power.

A new type Bendix chassis dynamometer with a hydraulic loading unit and complete instrumentation provides excellent facilities for the testing of complete chassis as well as for tune-up operations.

A well-equipped cold room containing two engine beds and fitted with unit type refrigerating equipment is found here. The control room adjacent

to the cold room contains a 100-hp. electric dynamometer which can be rolled on a track from one position to another and accurately located against stop blocks. All controls—throttle, ignition, etc.—run from the cold room to the control room where precise adjustments can be made.

Each of the engine stands in the main dynamometer room is provided with a complete set of equipment as follows:

Power connections and plug-in controls for electric dynamometer.

Water supply for hydraulic dynamometer.

Individual exhaust and breather lines running to pit outside of building.

Engine cooling system, made up of 30 gal. recirculating tank with cold water inlet controlled by thermostatic valve so that engine jackets will be maintained at a predetermined temperature.

Fuel weighing system which consists of an entirely automatic device for weighing the quantity of fuel delivered to an engine.

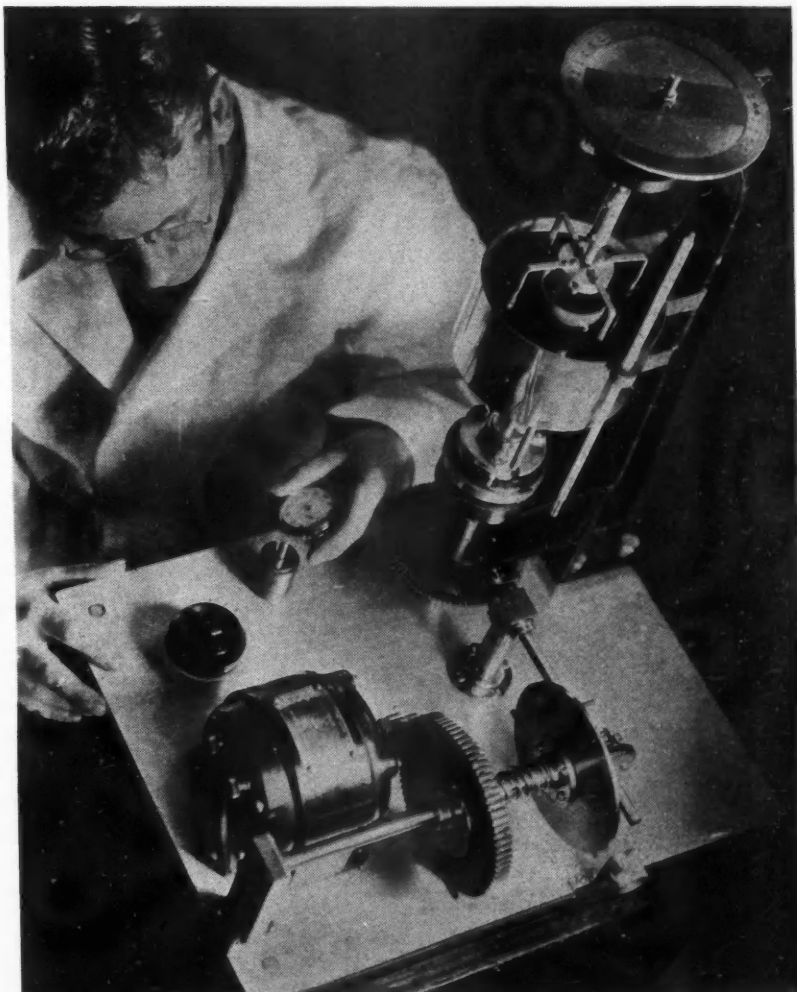
An engine control panel on which

the necessary meters and engine controls are mounted.

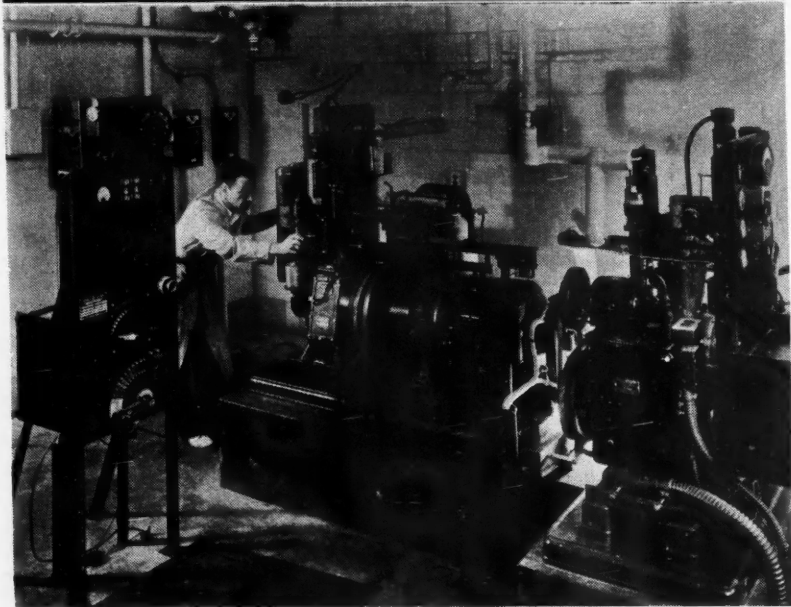
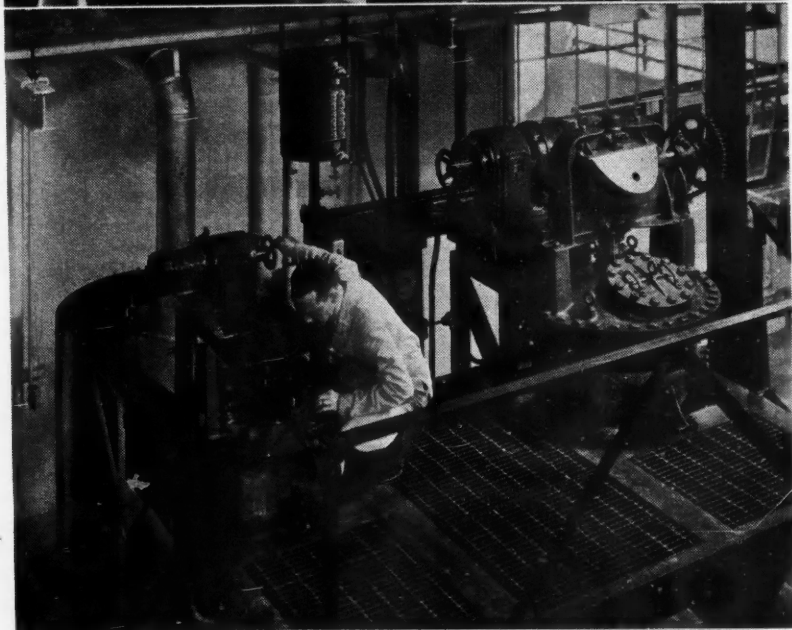
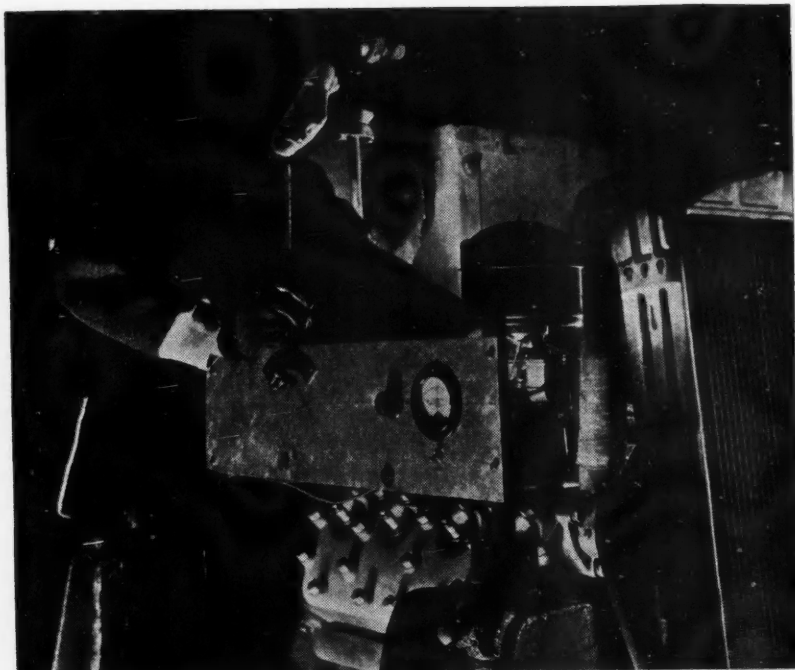
A board of U-tube gages for manifold pressures.

In addition to the test stands for commercial engine testing, the laboratory has special rooms in which fundamental and routine work is done on the familiar single-cylinder standard test engines, as well as on special single-cylinder set-ups. Among this equipment are—two C.F.R. engines normally running on the A.S.T.M. method and one C.F.R. engine running normally on the research method; one Army method engine for rating aviation fuels; and one high turbulence type, compression-ignition, Diesel fuel rating engine.

Special ignition lag indicator equipment has been designed for the Diesel fuel rating engine. A magnetic pick-up adapted from a Sunbury knock indicator is used to pick up time of ignition, while another magnetic unit is used on the end of the injector to pick up time of injection. These units are connected through a trip circuit amplifier to two neon bulbs mounted 15 deg.



A machine designed by Gulf for measurement of static and dynamic coefficients of friction of lubricants. The machine is similar in principle to the Herschel machine.



apart on the periphery of the flywheel and mounted through brushes and slip rings. In operation the engine is started at low compression ratio on the unknown fuel. Two flashes of the neon bulbs can then be seen on the flywheel, one at injection and one at start of ignition. Compression ratio is then raised until the two flashes merge into one. This indicates that the ignition lag is 15 deg. Reference fuels are then mixed to match this ignition lag at the same compression ratio.

In addition to the dynamometer equipment in the main room, there is an installation of a 5¼-in. bore by 8 in. stroke, single-cylinder Caterpillar Diesel test engine with electrical loading equipment. A single-cylinder high-speed Teetor engine with its own electrical loading equipment, also is provided.

So far as other special apparatus is concerned, there will be found a 9-in. cathode ray oscillograph with special pick-up equipment and circuits for use on combustion studies. To supplement the oscillograph for combustion studies, they have a specially designed and constructed Orsat apparatus for analyzing exhaust gas. This can be operated with such accuracy that the hydrogen-carbon ratio of fuels used can be calculated and correlated with a chemical micro-analysis of the fuel.

General purpose gasoline required for the various test apparatus is supplied from three 2000-gal. tanks buried outside of building. Fuel is raised by water pressure which is maintained constant by a float tank containing a float switch connected to a magnetic valve on water supply line. Air pressure is used to force water out of tanks for refilling. This method keeps gasoline fresh in storage.

A small shop, toolroom and stockroom are maintained for making small

(Top) Engine on block inside of cold room. Shaft connection to dynamometer on outside of cold room. This setup is being used to study the sludging effect of oil under winter driving conditions.

(Center) This is part of the pilot plant equipment for the manufacture of lubricating greases. A 15 gallon kettle is on the left, and a 50 gallon kettle on the right.

(Bottom) A typical C.F.R. setup showing two engines with common dynamometer and control.

parts, to aid in test set-ups and for equipment maintenance.

Much fundamental research work is being concentrated upon the development of synthetic fuels of high-octane rating, exceeding the 100-octane materials which have been discussed in recent literature.

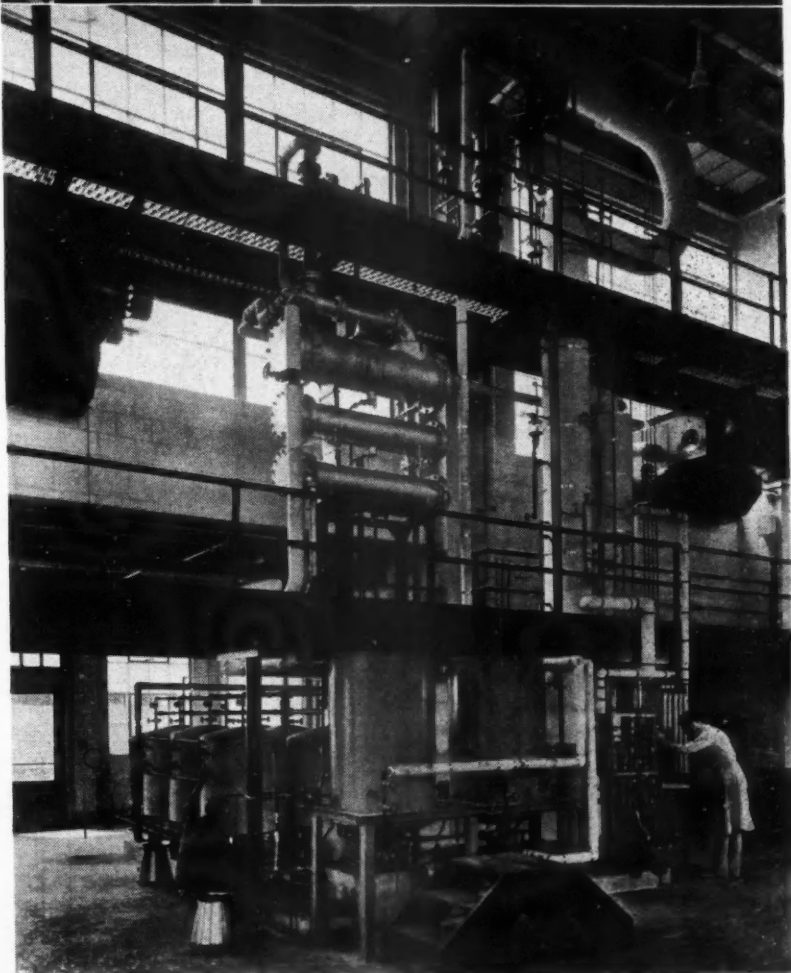
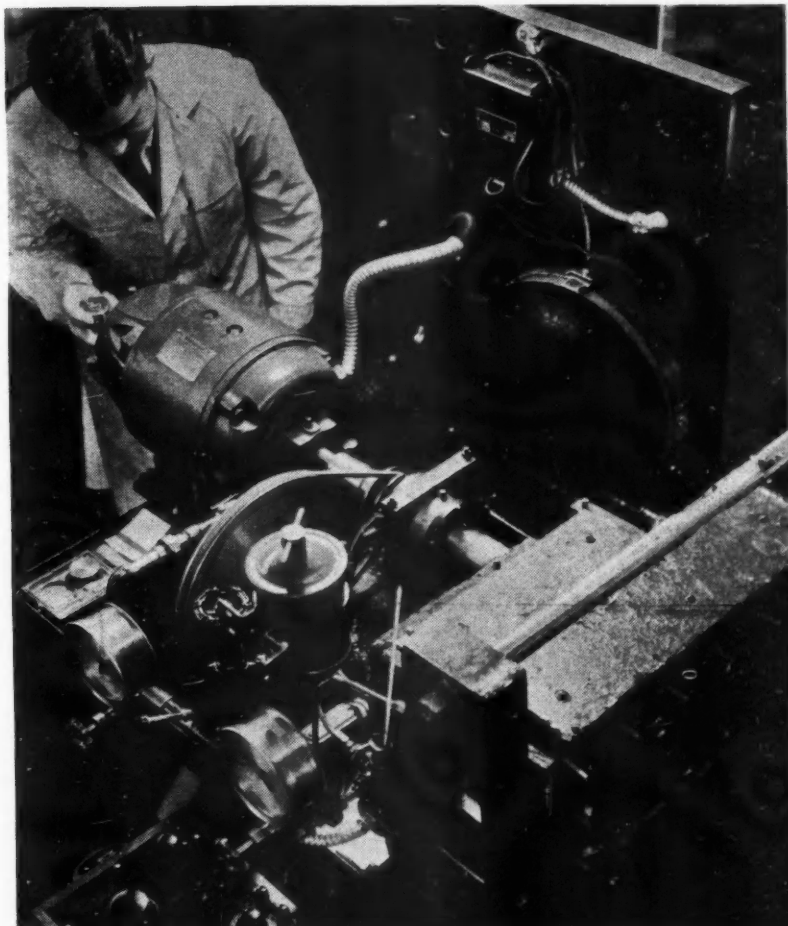
There also is a comprehensive program of fundamental studies on the effect of microscopic trace impurities upon the quality and behavior of petroleum products. Perhaps the best commentary on this work is the following quotation taken from a paper by Dr. Paul D. Foote*.

"As a result of fundamental studies of the molecular structure of petroleum, we are gradually accumulating significant performance data. We are learning something about the effects of minute traces of complicated organic chemicals which are usually present in the crude and may be preserved by certain methods of refining, may be synthesized during the refining process, or may be synthesized and added to the product at some stage in the manufacture. That the chemistry of minute traces will be the applied chemistry of the future is amply demonstrated in many fields. The petroleum technologist has awakened to the possibilities of microscopic chemistry and is rapidly finding his stride. We are already familiar with the effect of 0.0001 part of tetraethyl lead on the detonation of gasoline, with the effect of 0.00005 part of an organic halide on corrosiveness of gasoline, and with the effect of a few thousandths of per cent of various chemicals in the stabilizing of gasoline against deterioration during storage. Cracked gasoline without the trace of added chemical may polymerize so rapidly as to clog the feed line and carburetor of an automobile within a few days."

*Published in *Industrial and Engineering Chemistry*, July 20, 1937.

(Top) This machine is used for investigating lubrication of automobile connecting rod bearings under various conditions of load, speed, oil pressure, oil temperature and crankcase atmosphere.

(Bottom) This unit is a bubble plate fractionating column designed for continuous operation. It operates under atmospheric pressure or a high vacuum and is used to separate crude oil into the various commercial products such as gasoline, naphtha, kerosene, gas oil, lubricating distillates, cylinder stock, and asphalt. It may be used for plant control work or the small-scale manufacture of special products and is particularly useful in determining the yields of various products which may be obtained from a given crude oil.



Price Classes Shuffled

MAKE AND MODEL	Body Type and No. of Doors	1936 Factory Delivered Price	Basic 1937 Factory Delivered Price
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Under \$500

Bantam	Business Coupe	\$439	
Bantam	Standard Coupe	469	
Bantam	Roadster	479	
Willys	Economy Coupe	499	

\$500 to \$749

Willys	Standard Coupe	525	\$491
Willys	Standard Sedan	573	545
Willys	De Luxe Coupe	579	535
Ford	V8-60 Standard Coupe, 5win.	595*	529
Willys	De Luxe Sedan	624	590
Ford	V8-85 Standard Coupe, 5win.	625*	570
Ford	V8-60 Tudor Sedan	640*	544
Plymouth	Six P-5 Coupe, 2dr.	645	580
Chevrolet	Master Business Coupe	648	588
Ford	V8-85 Standard Tudor Sedan	665*	585*
Chevrolet	Master Coach, 2dr.	668	606
Ford	V8-60 Fordor Sedan	685*	604*
Ford	V8-85 De Luxe Coupe, 5win.	685*	633*
Plymouth	Six P-5 Sedan, 2dr.	685	620
Chevrolet	Master Town Sedan, Trunk, 2dr.	689	624
Ford	V8-85 Fordor Sedan	710*	670*
Chevrolet	Master De Luxe Business Coupe, 2dr.	714	655
Willys	Standard Custom Sedan	715	
Ford	V8-85 De Luxe Tudor Sedan	725*	673*
Chevrolet	Master De Luxe Coach, 2dr.	730	672
Chevrolet	Master Sedan, 4dr.	730	667
Plymouth	Six P-5 Sedan, 4dr.	730	665
Plymouth	De Luxe Six P-6 Coupe, 2p.	730	650
Ford	De Luxe V8-85 Club Coupe	745*	693

\$750 to \$999

Chevrolet	Master Sport Sedan, Trunk, 4dr.	750	685
Chevrolet	Master De Luxe Sport Coupe, 2dr.	750	693
Chevrolet	Master De Luxe Town Sedan, Trunk, 2dr.	750	690
Chevrolet	Master Cabriolet, 2dr.	755	694
Ford	De Luxe V8-85 Conv. Coupe	770*	
Ford	De Luxe V8-85 Fordor Sedan, 4dr.	770*	733
Nash-Lafayette	Master Business Coupe	770	
Plymouth	De Luxe Six P-6 Coupe, 2-4p.	770	700
Plymouth	De Luxe Six P-6 Sedan, 2dr.	773	715
Plymouth	De Luxe Six P-6 Touring Sedan, 2dr.	785	725
Chevrolet	Master De Luxe Sedan, 4dr.	796	739
Ford	De Luxe V8-85 Convertible Club Coupe	800*	758
Plymouth	De Luxe Six P-6 Sedan, 4dr.	803	745
Nash-Lafayette	Master Sedan, 2dr.	805	
Hudson-Terraplane	De Luxe 6-81 Coupe, 3p., 2dr.	806	715
Dodge	De Luxe 6-81 Bus. Coupe, 2dr.	808	715
Plymouth	De Luxe Six P-6 Touring Sedan, 4dr.	815	755
Chevrolet	Master De Luxe Sport Sedan, Trunk, 4dr.	817	757
Ford	De Luxe V8-85 Phaeton	820*	748
Nash-Lafayette	De Luxe Business Coupe	820	
Pontiac	De Luxe Six Business Coupe, 2dr.	835	736
Hudson-Terraplane	De Luxe 6-81 Brougham, 2dr.	840	735
Nash-Lafayette	Master Sedan, 4dr.	850	
Plymouth	De Luxe Six P-6 Convertible Coupe, 2dr.	850	830
Hudson-Terraplane	De Luxe 6-81 Vict. Coupe, 2dr.	852	760
Nash-Lafayette	De Luxe Sedan, 2dr.	855	
Dodge	De Luxe Coupe, 2dr.	858	770
Dodge	De Luxe Sedan, 2dr.	858	780

\$750 to \$999—Continued

Hudson-Terraplane	De Luxe 6-81 Touring Brougham, 2dr.	\$860	\$755
Nash-Lafayette	De Luxe A. P. Coupe	860	
Pontiac	De Luxe Six Sedan, 2dr.	865	785
De Soto	De Luxe Six Business Coupe, 2dr.	870	770
Dodge	De Luxe Six Touring Sedan, 2dr.	870	790
Oldsmobile	Six Business Coupe, 2dr.	870	765
Hudson-Terraplane	Super 6-82 Coupe, 2dr.	880	795
Hudson-Terraplane	De Luxe 6-81 Sedan, 4dr.	881	790
Pontiac	De Luxe Six Sport Coupe, 2dr.	891	808
Pontiac	De Luxe Six Touring Sedan, 2dr.	891	810
Studebaker	Six Bus. Coupe, 3p.	895	
Dodge	De Luxe Eight Sedan, 4dr.	898	820
Pontiac	De Luxe Eight Business Coupe, 2dr.	898	812
Ford	De Luxe V8-85 Convertible Sedan	900*	858
Nash-Lafayette	De Luxe Sedan	900	
Hudson-Terraplane	De Luxe 6-81 Touring Sedan, 4dr.	901	810
Dodge	De Luxe Eight Touring Sedan, 4dr.	910	830
Hudson-Terraplane	Super 6-82 Brougham, 2dr.	913	815
Oldsmobile	Six Sedan, 2dr.	916	825
Pontiac	De Luxe Six Sedan, 4dr.	916	836
Chrysler	Royal Six Business Coupe	918	810
Studebaker	Six Custom Coupe, 3p.	920	
Hudson-Terraplane	Super 6-82 Victoria, 2dr.	921	835
Oldsmobile	Six Club Coupe, 2dr.	926	825
De Soto	De Luxe Eight Touring Brougham, 2dr.	930	840
Hudson-Terraplane	Super 6-82 Touring Brougham, 2dr.	934	835
Pontiac	De Luxe Eight Sedan, 2dr.	934	848
Nash-Lafayette	De Luxe Cabriolet	940	
Oldsmobile	Six Touring Sedan, Trunk, 2dr.	941	850
Pontiac	De Luxe Six Touring Sedan, 4dr.	942	861
Hudson-Terraplane	De Luxe 6-81 Convertible Coupe, 2dr.	943	835
Hudson	6-83 Coupe, 3p., 2dr.	944	870
Buick	Special 40 Business Coupe, 2dr.	945	868
Hudson-Terraplane	Super 6-82 Sedan, 4dr.	950	865
Pontiac	De Luxe Eight Sport Coupe, 2dr.	955	868
De Soto	De Luxe Eight Sedan, 4dr.	958	870
Pontiac	De Luxe Eight Touring Sedan, 2dr.	960	874
Chrysler	Royal Six Coupe, 2dr.	963	860
Chrysler	Royal Six Brougham, 2dr.	963	870
Studebaker Commander	Six Custom Coupe	965	
Oldsmobile	Six Sedan, 4dr.	967	875
De Soto	De Luxe Eight Touring Sedan, 4dr.	970	880
Hudson-Terraplane	Super 6-82 Touring Sedan, 4dr.	970	885
Nash Ambassador	Six Business Coupe	970	
Chrysler	Royal Six Touring Brougham, 2dr.	975	880
Pontiac	De Luxe Eight Sedan, 4dr.	980	894
Buick	Special 40 Sport Sedan, 2dr.	981	914
Hudson	Six 6-83 Brougham, 2dr.	983	895
Studebaker	Six Club Sedan	985	
Oldsmobile	Eight Business Coupe, 2dr.	986	880
Hudson	Six 6-83 Victoria Coupe, 2dr.	990	915
Oldsmobile	Six Touring Sedan, Trunk, 4dr.	992	900
Pontiac	De Luxe Six Cabriolet, 2dr.	993	900
Graham	Standard Coupe	995	
Studebaker	Six Cruising Sedan	995	
Chrysler	Royal Six Sedan, 4dr.	998	910

ABBREVIATIONS

p—Passenger
dr.—Door

*—Exclusive of Federal Excise Tax
A. P.—All purpose
W. B.—Wheelbase

on Passenger Cars in 1938 Lineup. \$500 to \$750 d.i.D. group loses many listings

MAKE AND MODEL	Body Type and No. of Doors	1938 Factory Delivered Price	Basic 1937 Factory Delivered Price
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\$1000 to \$1499

Buick.....Special 40	Touring Sedan, 2dr.	\$1000	\$940
Nash Ambassador.....Six	Sedan, 2dr.	1000	910
Buick.....Special 40	Sport Coupe, 2dr.	1001	930
Hudson.....Six 6-83	Touring Brougham, 2dr.	1003	920
Plymouth.....De Luxe Six P-6	Sedan, 7p.	1005	995
Hudson Terraplane.....Super 6-82	Conv. Coupe, 2dr.	1006	905
Pontiac.....De Luxe Eight	Touring Sedan, 4dr.	1006	920
Hudson Terraplane.....De Luxe 6-81	Conv. Brougham, 2dr.	1007	915
Chrysler.....Royal Six	Touring Sedan, 4dr.	1010	920
Nash Ambassador Six.....	A. P. Coupe	1015	925
Hudson Six.....6-83	Sedan, 4dr.	1020	945
Buick.....Special 40	Sport Sedan, 4dr.	1022	950
Hudson.....De Luxe 8-84	Coupe, 3p, 2dr.	1025	915
Oldsmobile.....Eight	Sedan, 2dr.	1027	940
Studebaker Commander.....	Club Sedan	1030	.....
Oldsmobile.....Eight	Club Coupe, 2dr.	1032	940
Hudson.....Six 6-83	Touring Sedan, 4dr.	1040	970
Studebaker Commander.....	Cruising Sedan	1040	.....
Oldsmobile.....Six	Conv. Coupe, 2dr.	1043	920
DeSoto.....	Conv. Coupe	1045	975
Graham.....Standard	Comb. Coupe	1045	.....
Hupmobile.....Six	Std. Sedan	1045	.....
Buick.....Special 40	Touring Sedan, 4dr.	1047	976
Nash Ambassador.....Six	Sedan, 4dr.	1050	960
Oldsmobile.....Eight	Touring Sedan, 2dr.	1053	965
Pontiac.....De Luxe Eight	Cabriolet, 2dr.	1057	940
Hudson.....De Luxe 8-84	Victoria Coupe, 2dr.	1063	985
Hudson.....De Luxe 8-84	Brougham, 2dr.	1064	970
Graham.....Standard	Sedan, 4dr.	1065	.....
Hudson Terraplane.....Super 6-82	Conv. Brougham, 2dr.	1069	985
Packard Six.....1600	Business Coupe	1075	895
Hudson.....6-83	Conv. Coupe	1076	970
Oldsmobile.....Eight	Sedan, 4dr.	1078	990
Hudson.....De Luxe 8-84	Touring Brougham, 2dr.	1084	995
Hudson.....Custom 8-85	Coupe, 3p, 2dr.	1090	1020
Nash Ambassador.....Six	Cabriolet, 2dr.	1090	975
Graham.....Special	Business Coupe	1095	.....
Hudson.....De Luxe 8-84	Sedan, 4dr.	1095	1010
Plymouth.....De Luxe Six P-6	Sedan Limousine	1095	1095
Buick.....Special 40	Conv. Coupe, 2dr.	1103	1011
Oldsmobile.....Eight	Touring Sedan, 4dr.	1104	1015
Hudson.....De Luxe 8-84	Touring Sedan, 4dr.	1115	1035
Nash Ambassador.....Eight	Business Coupe	1120	990
Packard Six.....1600	Club Coupe	1120	.....
Studebaker President.....	Custom Coupe	1120	.....
Chrysler Imperial.....Eight	Business Coupe, 2dr.	1123	1030
Graham.....Special	Comb. Coupe	1135	.....
Hudson.....6-83	Conv. Brougham	1139	1055
Hudson.....Custom 8-85	Victoria Coupe, 2dr.	1141	1070
Hudson.....Custom 8-85	Brougham, 2dr.	1144	1065
Packard Six.....1600	Touring Sedan, 2dr.	1145	1010
Nash Ambassador.....Eight	Sedan, 2dr.	1150	1030
Graham.....Special	Sedan, 4dr.	1155	.....
Hudson.....De Luxe 8-84	Conv. Coupe	1156	1050
Chrysler Imperial.....Eight	Coupe, 2dr.	1160	1070
Oldsmobile.....Eight	Conv. Coupe, 2dr.	1160	1035
Chrysler Imperial.....Eight	Touring Brougham, 2dr.	1165	1070
Hudson.....Custom 8-85	Touring Brougham, 2dr.	1165	1090
Nash Ambassador.....Eight	A. P. Coupe	1165	1045
Packard Six.....1600	Touring Sedan, 4dr.	1175	.....

\$1000 to \$1499—Continued

Hupmobile.....Six	Sedan, 4dr.	\$1180	.....
Hudson.....Custom 8-85	Sedan, 4dr.	1181	\$1110
Studebaker President.....	Club Sedan	1185	.....
De Soto.....	Sedan, 7p, 4dr.	1195	1120
Studebaker President.....	Cruising Sedan	1195	.....
Chrysler Imperial.....Eight	Touring Sedan, 4dr.	1198	1100
Nash Ambassador.....Eight	Sedan, 4dr.	1200	1080
Hudson.....Custom 8-85	Touring Sedan, 2dr.	1201	1135
Hudson Country Club.....8-87	Sedan, 4dr.	1209	1140
Hudson.....De Luxe 8-84	Conv. Brougham	1220	1135
Hupmobile.....De Luxe Six	Sedan, 4dr.	1222	.....
Packard Eight.....1601	Business Coupe	1225	1065
Buick Century.....60	Sport Coupe, 2dr.	1226	1142
Hudson Country Club.....8-87	Touring Sedan, 4dr.	1229	1165
Graham.....Supercharger	Business Coupe	1230	.....
Packard Six.....1600	Conv. Coupe, 2-4p.	1235	1010
Nash Ambassador.....Eight	Cabriolet, 2dr.	1240	1095
Buick Century.....60	Touring Sedan, 2dr.	1256	1152
Graham.....Supercharger	Comb. Coupe	1270	.....
Packard Eight.....1601	Club Coupe	1270	.....
Buick Century.....60	Sport Sedan, 4dr.	1272	1162
De Soto.....	Limousine, 7p.	1285	1220
Graham.....Supercharger	Sedan, 4dr.	1290	.....
Lincoln Zephyr.....	Coupe, 3p, 2dr.	1295*	1165*
Packard Eight.....1601	Touring Sedan, 2dr.	1295	1135
Buick Century.....60	Touring Sedan, 4dr.	1297	1188
La Salle.....Series 38-50	Coupe	1300	1095
Pontiac.....De Luxe Six	Conv. Sedan	1310	.....
Graham.....Custom Supercharger	Business Coupe	1320	.....
Hupmobile Eight.....	Touring Sedan, 4dr.	1325	.....
Packard Eight.....1601	Touring Sedan, 4dr.	1325	1185
Hupmobile.....Custom Six	Sedan, 4dr.	1340	.....
La Salle.....Series 38-50	Touring Sedan, 2dr.	1340	1215
Studebaker Six.....	Conv. Sedan	1345	.....
Pontiac.....De Luxe Eight	Conv. Sedan	1353	.....
Lincoln Zephyr.....	Sedan, 2dr.	1355*	1245*
Buick Century.....60	Conv. Coupe, 2dr.	1359	1224
Graham.....Custom Supercharger	Comb. Coupe	1360	.....
Hupmobile.....De Luxe Eight	Touring Sedan, 4dr.	1365	.....
Packard Eight.....1601	Conv. Coupe, 2-4p.	1365	1185
De Soto.....	Conv. Sedan, 4dr.	1375	1300
Lincoln Zephyr.....	Sedan, 4dr.	1375	1265
Graham.....Custom Supercharger	Sedan, 4dr.	1380	.....
La Salle.....38-50	Touring Sedan, 4dr.	1380	1260
Studebaker Commander.....	Conv. Sedan	1390	.....
Buick Special.....40	Conv. Phaeton, 4dr.	1406	1257
La Salle.....Series 38-50	Conv. Coupe	1415	1290
Hupmobile.....Custom Eight	Touring Sedan, 4dr.	1485	.....

\$1500 to \$1999

Packard Eight De Luxe.....1601-D	Touring Sedan	1540	1400
Lincoln Zephyr.....	Limousine	1550*	1425
Studebaker President.....	Conv. Sedan	1555	.....
Buick Roadmaster.....80	Sport Sedan	1645	.....

ABBREVIATIONS

p—Passenger
dr.—Door

*—Exclusive of Federal Excise Tax
A. P.—All purpose
W. B.—Wheelbase

Price Classes Shuffled

MAKE AND MODEL	Body Type and No. of Doors	1938 Factory Delivered Price	Basic 1937 Factory Delivered Price
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\$1500 to \$1999—Continued

Buick Roadmaster.....	80	Touring Sedan.....	\$1645	\$1418
Lincoln Zephyr.....		Conv. Coupe.....	1650*	
Packard Eight.....	1601	Conv. Sedan.....	1650	1485
Buick Century.....	60	Conv. Phaeton, 4dr.....	1713	1479
Buick Roadmaster.....	80	For. Sedan, Trk., 4dr.....	1758	1541
Lincoln Zephyr.....		Conv. Sedan.....	1790*	
La Salle.....	Series 38-50	Conv. Sedan.....	1820	1620
Packard Eight.....	1602	Touring Sedan, 7p.....	1955	
Buick Roadmaster.....	80	Conv. Phaeton, 4dr.....	1983	1756

\$2000 to \$2999

Cadillac V8.....	Series 60	Touring Sedan, 5p., 5whl.....	2085	1660
Packard Super Eight.....	1602	Touring Limousine.....	2110	
Buick Limited.....	90	Touring Sedan, 4dr.....	2176	2140
Cadillac V8.....	Series 65	Touring Sedan, 5p.....	2285	2090
Chrysler.....	Custom Imperial Eight	Sedan, 5p.....	2295	
Chrysler.....	Custom Imperial Eight	Sedan, 4dr., 7p.....	2295	2060
Buick, Limited.....	90	Touring Sedan, 4dr.....	2350	1966
Cadillac, V8.....	Series 65	Touring Sedan 5p. (Div.).....	2360	
Chrysler.....	Custom Imperial Eight	Sedan Limousine, 4dr., 7p.....	2395	2160
Buick, Limited.....	90	Limousine, Trunk, 4dr.....	2453	2242
Cadillac, V8.....	Series 65	Conv. Sedan, 5p, 5whl.....	2600	
Packard Super Eight.....	1603	Touring Sedan, 4dr.....	2790	
Packard, Super Eight.....	1604	Coupe, 2-4p.....	2925	2565
Packard Super Eight.....	1604	Coupe, 5p.....	2965	2660
Packard Super Eight.....	1604	Club Sedan.....	2990	2680
Packard Super Eight.....	1604	Touring Sedan, 4dr.....	2995	2685

\$3000 to \$4999

Cadillac, V8.....	Series 75	Touring Sedan, 5p.....	3075	2815
Cadillac, V8.....	Series 75	Livery, Sedan 5p.....	3105	
Cadillac, V8.....	Series 75	Touring Sedan.....	3155	
Packard, Super Eight.....	1605	Touring Sedan, 7p.....	3165	2860
Cadillac V8.....	Series 75	Touring Sedan, 7p.....	3205	2970
Packard, Super Eight.....	1604	Convertible Coupe, 2-4p.....	3210	
Cadillac-V8.....	Series 75	Liv. Imp. Touring, 8p.....	3255	2950
Cadillac-V8.....	Series 75	Coupe, 2p.....	3275	
Packard, Super Eight.....	1605	Touring Limousine.....	3305	2995
Cadillac-V8.....	Series 75	Imperial Touring Sedan, 7p.....	3360	3170
Pierce-Arrow, Eight.....	1801	Coupe.....	3375	3375
Pierce-Arrow, Eight.....	1801	Sedan.....	3375	3375
Cadillac, V8.....	Series 75	Convertible Coupe, 2p.....	3380	
Cadillac, V8.....	Series 75	Coupe 3-5p.....	3380	
Pierce-Arrow, Eight.....	1801	Convertible Roadster.....	3480	3480
Pierce-Arrow, Eight.....	1801	Club Sedan.....	3480	3480
Pierce-Arrow, Eight.....	1801	Formal Sedan.....	3630	3630
Pierce-Arrow, Eight.....	1801	Club Berline.....	3630	3630
Cadillac.....	Series 75	Town Sedan, 5p.....	3635	3325
Packard, Super Eight.....	1604	Victoria.....	3670	3310
Pierce-Arrow, Eight.....	1801	Sedan, 7p.....	3690	3690
Packard, Super Eight.....	1604	Formal Sedan.....	3710	3400
Pierce-Arrow, Eight.....	1801	Enclosed Drive Limousine.....	3840	3840
Pierce-Arrow, Twelve.....	1802	Coupe.....	3895	3895
Pierce-Arrow, Twelve.....	1802	Sedan.....	3895	3895
Cadillac-V8.....	Series 75	Convertible Sedan, Trunk.....	3940	3630
Packard, Super Eight.....	1605	Convertible Sedan.....	3970	3515
Cadillac-V8.....	Series 75	Formal Sedan, 5p.....	3990	3685
Cadillac-V8.....	Series 75	Formal Sedan, 7p.....	3990	
Pierce-Arrow, Twelve.....	1802	Convertible Roadster.....	4000	4000
Pierce-Arrow, Twelve.....	1802	Club Sedan.....	4000	4000
Packard, Twelve.....	1607	Coupe 2-4p, 6 whl.....	4135	3720

MAKE AND MODEL	Body Type and No. of Doors	1938 Factory Delivered Price	Basic 1937 Factory Delivered Price
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\$3000 to \$4999—Continued

Packard, Twelve.....	1607	Touring Sedan, 4dr.....	\$4155	\$3740
Pierce-Arrow, Twelve.....	1802	Formal Sedan.....	4155	4155
Pierce-Arrow, Twelve.....	1802	Club Berline.....	4155	4155
Packard, Twelve.....	1607	Coupe, 5p.....	4185	3770
Pierce-Arrow-Twelve.....	1802	Sedan, 7p.....	4210	4210
Packard Twelve.....	1607	Club Sedan.....	4255	3845
Pierce-Arrow, Eight.....	1801	Convertible Sedan.....	4300	4300
Pierce-Arrow, Twelve.....	1802	Enclosed Drive Limousine.....	4360	4360
Packard, Twelve.....	1607	Conv. Coupe, 2-4 p, 6 whl.....	4370	
Packard, Twelve.....	1608	Touring Sedan, 7p.....	4485	4070
Packard, Twelve.....	1608	Touring Limousine.....	4690	4275
Pierce-Arrow, Twelve.....	1802	Convertible Sedan.....	4820	4820
Packard, Twelve.....	1607	Formal Sedan.....	4865	4455
Lincoln, V12.....	136 W.B.	Sedan 4dr, 2w.....	4900*	4450
Lincoln, V12.....	136 W.B.	Sedan, 4dr, 3w.....	4900*	4450

\$5000 and Over

Lincoln, V12.....	145 W.B.	Sedan.....	5100*	4750*
Pierce-Arrow, Twelve.....	1803	Sedan.....	5015	5015
Cadillac, V8.....	Series 75	Town Car, 7p.....	5115	4755
Cadillac-Sixteen.....	Series 90	Touring Sedan.....	5135	
Lincoln, V12.....	145 W.B.	Limousine.....	5200*	4850
Cadillac, Sixteen.....	Series 90	Touring Sedan (Div.).....	5215	
Pierce-Arrow, Twelve.....	1803	Enclosed Drive Limousine.....	5220	5220
Packard, Twelve.....	1607	Victoria, 6 whl.....	5230	4815
Cadillac, Sixteen.....	Series 90	Touring Sedan, 7p.....	5265	
Lincoln, V12.....	136 W.B.	Coupe.....	5300*	4950*
Lincoln, V12.....	136 W.B.	Convertible Roadster.....	5300*	4950*
Cadillac, Sixteen.....	Series 90	Coupe, 2p.....	5335	7645
Packard, Twelve.....	1608	Convertible Sedan, 6 whl.....	5390	4975
Cadillac, Sixteen.....	Series 90	Imperial Touring Sedan, 7p.....	5420	
Cadillac, Sixteen.....	Series 90	Convertible Coupe.....	5440	8105
Cadillac, Sixteen.....	Series 90	Coupe, 5p.....	5440	7800
Pierce-Arrow, Eight.....		Brunn, Town Bro.....	5520	5520
Cadillac, Sixteen.....	Series 90	Town, Sedan.....	5695	7495
Lincoln, V12.....	145 W.B.	Convertible Sedan, Le B.....	5800	5450
Lincoln, V12.....	136 W.B.	Will'by Coupe.....	5900*	5550*
Lincoln, V12.....	136 W.B.	Brunn, Victoria.....	5900*	5550*
Lincoln, V12.....	145 W.B.	Will'by, Touring.....	5900*	5550*
Cadillac, Sixteen.....	Series 90	Convertible Sedan, Trunk.....	6000	8105
Lincoln, V12.....	145 W.B.	Convertible Sedan, Le B.....	6000*	5650
Lincoln, V12.....	145 W.B.	Jud. Berline.....	6000*	5650*
Pierce-Arrow, Twelve.....	1802	Brunn, Town Bro.....	6040	6040
Cadillac, Sixteen.....	Series 90	Formal Sedan, 5p.....	6050	
Cadillac, Sixteen.....	Series 90	Formal Sedan, 7p.....	6050	
Lincoln, V12.....	145 W.B.	Jud. Berline.....	6100*	5750*
Lincoln, V12.....	145 W.B.	Will'by, Limousine.....	6200*	5850*
Lincoln, V12.....	145 W.B.	Jud. Sedan, Limousine.....	6300*	5950*
Lincoln, V12.....	145 W.B.	Brunn, Cabriolet.....	6900*	6650*
Lincoln, V12.....	145 W.B.	Will'by, Sport Sedan.....	7000*	6850*
Lincoln, V12.....	145 W.B.	Brunn, Cabriolet.....	7000*	6750*
Lincoln, V12.....	145 W.B.	Brunn, Brougham.....	7000*	6750*
Cadillac, Sixteen.....	Series 90	Town Car, 7p.....	7170	
Lincoln, V12.....	145 W.B.	Brunn, Touring Cabriolet.....	7200*	6950*
Lincoln, V12.....	145 W.B.	Will'by, Panel Bro.....	7400*	7050*

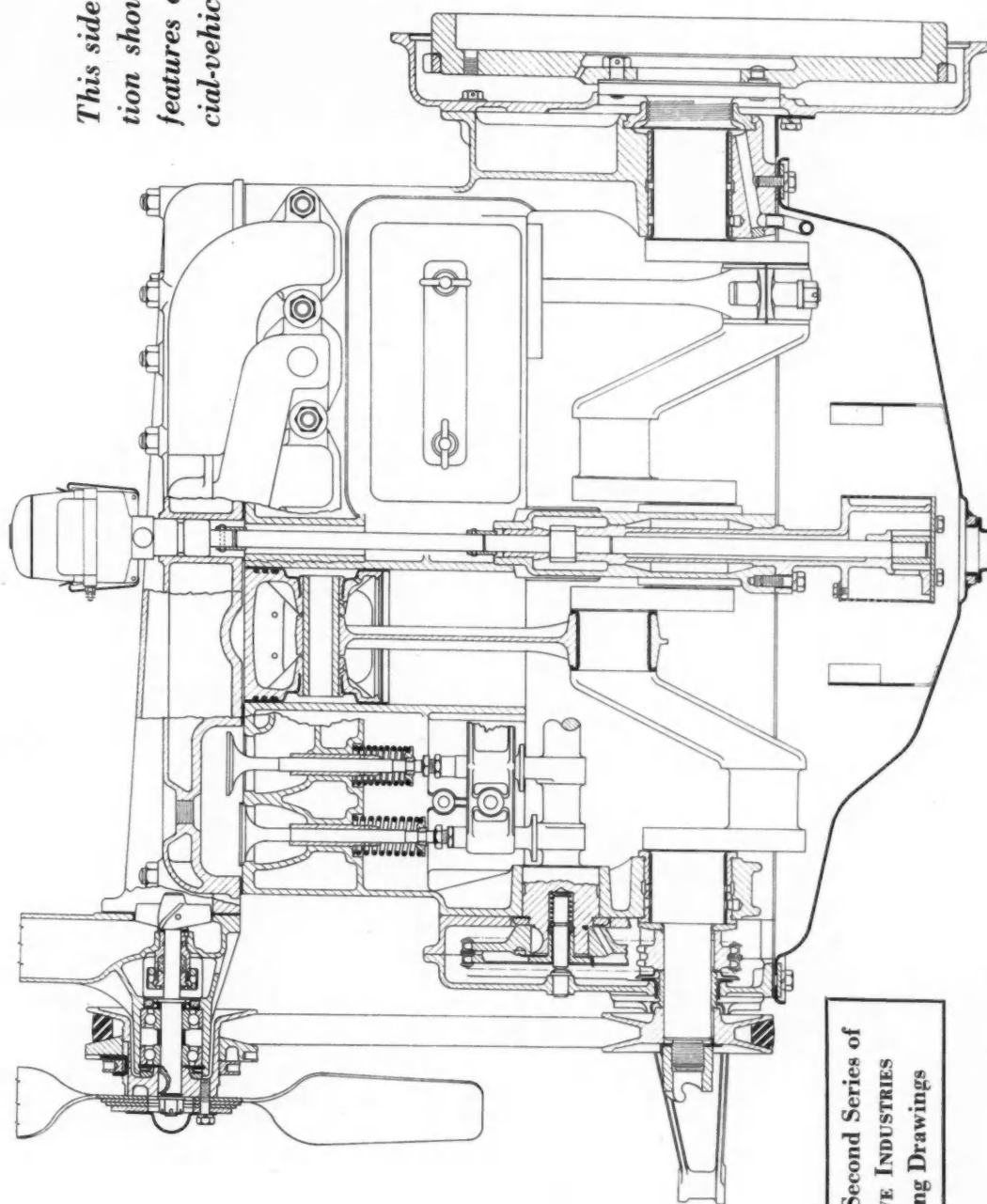
ABBREVIATIONS

p—Passenger
dr.—Door

*—Exclusive of Federal Excise Tax
A. P.—All purpose.
W. B.—Wheelbase

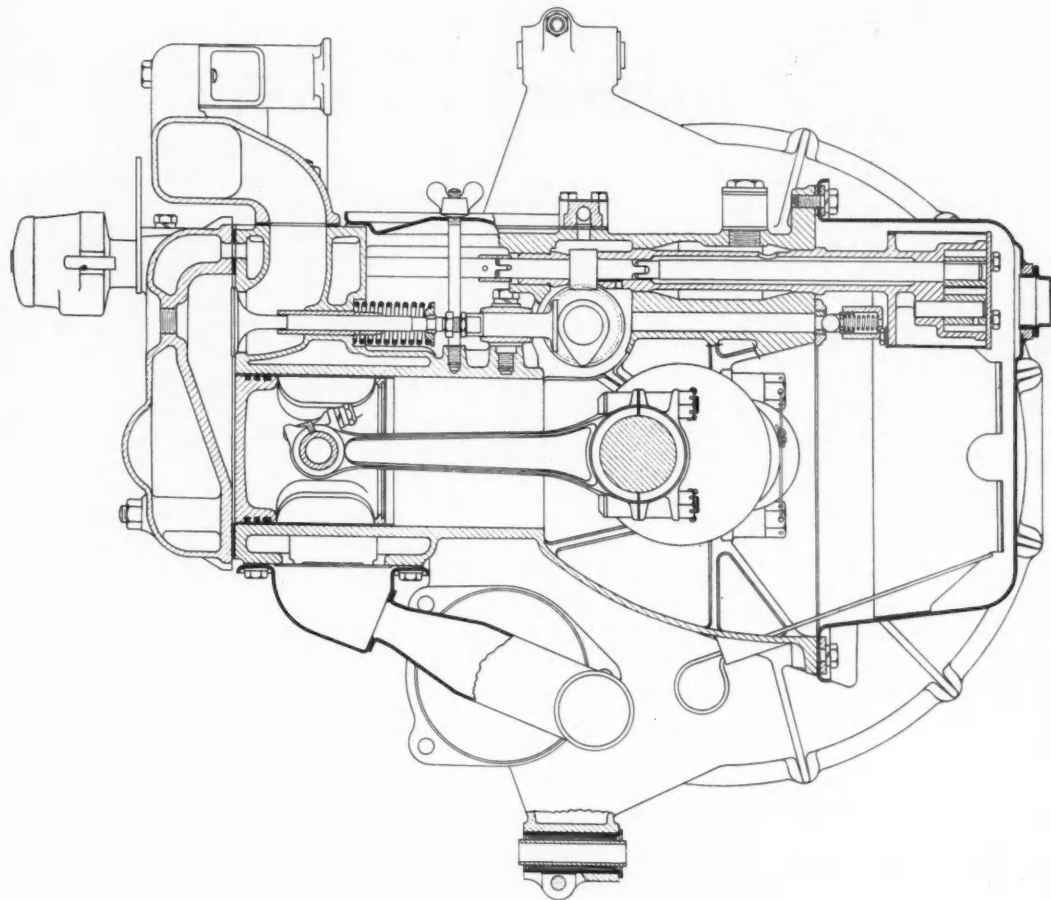
Morris Engine for 1 1/2-Ton Trucks

This side elevation partly in section shows many of the design features of this 57-hp. commercial-vehicle engine.



No. 4 of the Second Series of
AUTOMOTIVE INDUSTRIES
Engineering Drawings

Morris Engine for 1 1/2-Ton Trucks



This engine, the product of Morris Commercial Cars, Ltd., Adderley Park, Birmingham, England, has four cylinders of 100 mm. bore by 112 mm. stroke (3.90 by 4.40 in.) and a piston displacement of 211 cu. in. With a compression ratio of 5 it develops 57 b. hp. at 2700 r.p.m. The maximum torque is 150 lb.-ft. at 1100 r.p.m., and the b.m.e.p. 105 lb. per sq. in. at 1300 r.p.m., 100 lb. per sq. in. at 1700 r.p.m., 90 lb. per sq. in. at 1950 r.p.m. and 80 lb. per sq. in. at 2600 r.p.m.

Cylinders and crankcase are cast in a single block. The three-bearing crankshaft has 2 1/8-in. main bearings of 2 1/8, 2 3/8 and 3 1/8-in. length (front to rear respectively). Crankpins are 2 in. in diameter and 1 3/4 in. in length. A duplex chain drive is used for the camshaft and generator, the latter being mounted so as to permit of chain adjustment.

Other features of design and equipment include Flower "bi-metal" steel-and-aluminum pistons, steel connecting rods of 3 1/2 in. center-to-center length, silicon-chromium valves, a Solex self-start carburetor, gravity fuel feed, assisted thermosiphon circulation of cooling water, and pressure lubrication to main, big-end and camshaft bearings.



New Hudson cars leaving the end of the production line at a faster rate than for any time in twelve years.

Production Lines

function was to produce chairs for the men on the balcony and they did it in true Continental fashion. Our friends of the GM public relations staff deserve no end of plaudits for the way the whole thing was handled.

Worker Comfort

Out of the gamut of technical papers on industry problems from the National Safety Congress in Kansas City, come two contributions of interest to automotive executives. Dr. Roy R. Jones, medical adviser of the Department of Labor, urged rigid control of toxic fumes in metal trades. While seldom fatal, metal fume fever caused by inhaling minute particles of metal diffused in the air during molding, smelting, and welding operations is responsible for much discomfort and loss of efficiency. Care in planning operations combined with scientific ventilation should be undertaken by the employer to provide an effective control.

Zephyr Progress

In preparation for the '38 Lincoln-Zephyr, plant capacity has been doubled to provide facilities for the production of at least 60,000 units. This results in over three miles of overhead conveyor lines. In machine shop lines there are over 4000 operations requiring the use of Jo-blocks for precise measurement; and over 200 parts held to tolerances of better than 0.0005 in.

Show Stuff

Four exhibits at the Palace in New York won their share of the public's interest most deservedly, in our opinion. First was the Studebaker with its entire body superstructure above the belt line hinged and movable so as to reveal all interior detail in beautiful

fashion. DeSoto had a somewhat similar scheme except that they hinged the entire body side panel. Then Chrysler put on quite a show with the huge crown that concealed an entire sedan. The elucidators in costume gave the "crown" idea quite a natural court atmosphere. Finally, there was the handsome presentation of the Cadillac V-16 engine. It revolved slowly on a turntable, at the same time dipping in the vertical plane by means of an ingenious trunnion mechanism. You could see every part of this amazing engine while standing in one spot.

Splendid Spirit

Of the few functions we had time to attend during New York Show Week, none appealed to us so much as the two technical luncheons staged by General Motors. The one for technical editors—an opportunity to meet with the chief engineers, "Boss" Kettering and O. E. Hunt—is of several years standing and is most pleasant. This year the festive board was graced by a number of the more engineering minded divisional general managers. The other—the Diesel Transportation Progress Luncheon—was most interesting and educational and above all, beautifully staged. We are naturally inclined to look to the background staging. Nothing delighted us more than to see the stream of bell-boys issue from a side entrance at the precise instant that Mr. Sloan asked the group on the side balcony to move onto the main floor so as to view the motion picture. Said bell-boys'

Five Million

Optimism born of a prospective 5,000,000 unit year was responsible for one of the largest plant expansion and modernization programs in the history of the auto industry. Among the largest expenditures are those at Buick, Chevrolet, and Packard. Studebaker spent over \$3,500,000, while Nash accounted for about \$5,000,000. Apart from the general modernization program at Buick, which has been growing during the past three years, the company has invested almost \$5,000,000 in the new transmission plant built for the new automatic unit. These things all happened before the recent stock market recession, but it is doubtful whether the long-range planning would ever be affected by the sporadic flurries on the stock exchange.

Hypoid Axles

The hypoid rear end has pretty well swept the field for '38, at least on the basis of percentage of models so equipped. The latest convert is Lincoln-Zephyr, following the extension of hypoid to the larger models of Buick and Cadillac. Despite the forebodings of last season, the hypoid has given an excellent account of itself during the past year. Refinements in bearing mountings, in gear lapping procedure, and in other details promise to produce 100 per cent service history for next year. Our ear to the ground indicates that some of those not now using hypoid have been giving it a lot of thought and may swing in next season.

—J. G.

It Takes Dollars to Cheat Death

(Continued from page 706)

\$40,000,000. An estimated \$15,000,000 is being spent by the States today. In other words, we are \$25,000,000 short of the money to do a good job along these lines.

That is a flash picture of the kind of a job it is and quite obviously the responsibility for this job rests with public officials and must be publicly financed. Speaking generally, public officials recognize this and are earnest and eager for accident reduction.

A civic organization such as the Automotive Safety Foundation can be useful only to the extent that it can be of assistance to public officials in the discharge of their responsibility.

The program of the Foundation was developed only after lengthy discussion with representatives of all these groups. We gathered from our conversations that we could be helpful along these lines: First, there was need of research and training in the fields of

enforcement and traffic engineering. Second, there was a need of direct aids in educational activities and a stimulation of interest on the part of the schools in driver training. Third, there was a vital need of State and community safety organizations so that the officials who were responsible could, through public understanding of the problem, obtain both political and financial support for their programs.

Having learned something about the safety program and about the types of assistance needed by the public officials, the next question was how we should work. After surveying the field we concluded that it would be most unwise to set up new competition in the safety field. We, therefore, decided to work through existing national organizations who were well-equipped to carry out the work, except for one thing, and that was money.

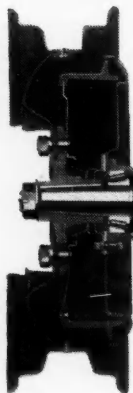
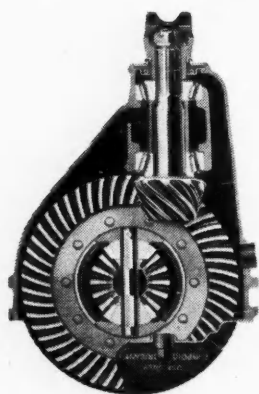
By supplying the money we hoped to both stimulate and accelerate the activities and also to secure a greater degree of coordination.

In the field of enforcement we selected Northwestern University which already had its Traffic Institute, and the International Association of Chiefs of Police, who had a safety division very interested in accident investigation methods. In the field of traffic engineering we selected Harvard University which had had a Bureau for Street Traffic Research for a number of years. In the field of education our work has been carried out by the Highway Education Board, the National Education Association and the American Automobile Association. The American Automobile Association has been carrying on a vigorous campaign in driver training. In the field of adult education we have been working with the American Legion, The Elks, The 4-H Clubs, The General Federation of Women's Clubs, The National Congress of Parents & Teachers and The National Grange. The heavy responsibility of State and community safety organization was assigned to the National Safety Council.

Next, what's been accomplished?

In the field of enforcement and under the direction of Lieut. Frank Kreml, the International Association of Chiefs of Police has sponsored the installation of accident prevention bureaus in 11 cities and have serviced four such bureaus previously organized. These 15 cities reduced their fatality rate an average of 16 7/10 per cent during the first seven months of 1937, compared with the same period of 1936.

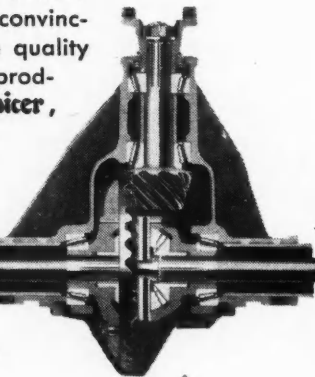
Through the Northwestern University Traffic Safety Institute more than 450 urban and State police have been given specialized traffic control training in short courses conducted



● At this time of year, when the industry is conducting the first showing of its 1938 offerings, it is interesting to consider that most of today's passenger cars and commercial vehicles are Spicer-equipped.

Ever since the very early days of the industry, Spicer equipment has been an important factor in the efficiency, dependability and economy of motor vehicle performance. This is still true today, when we are about to enter another year which will so clearly demonstrate the constant progress made by the industry.

Spicer has enjoyed long and successful relationships with many leading manufacturers; in some cases these connections have endured for more than thirty years. Here is convincing proof, not only of the quality and reliability of Spicer products, but also of the fact Spicer, like the industry, is constantly moving forward.



New Salisbury Axle for passenger cars and light duty commercial vehicles.

Spicer Manufacturing Corporation
Toledo • Ohio

BROWN-LIPE
CLUTCHES and
TRANSMISSIONS

SALISBURY
FRONT and REAR
AXLES

SPICER
UNIVERSAL
JOINTS

PARISH
FRAMES
READING, PA.

under the auspices of universities in seven States. These men have returned to their own departments and are thereby stepping-up the quality of enforcement. A profession within a profession is developing.

As a result of a direct grant to the National Education Association a safety film was developed last year for use in instructing school children. Fifty copies of this film have been kept circulating with a demand far exceeding the supply.

Perhaps the most important educational activity now under way is the survey of safety instruction now being made by the National Education Association under a grant made by us to the Highway Education Board. It is only fair to say that the National Conservation Bureau has been largely responsible for interest on the part of educators in this survey, which has resulted in the 1940 Yearbook of the National Education Association being devoted to safety. This is a formal recognition on the part of the educators, which is tremendously important. Stephen James of the Highway Education Board is participating most actively in this project.

Educational Course for Officers

In the field of safety organization, the National Safety Council during the past summer conducted the first short course on this subject for more than 60 State and local safety directors from 25 States. The organizing ability of Sidney Williams has been effective in this as it has in the whole field of community organization. In addition to his direct activity in assisting public officials to organize States and communities for safety, he has been called upon by the Motor Vehicle Administrators to develop technical procedures in the administration of the Driver's License Law. This has been particularly true in the case of those States which enacted their first license law this year.

In the field of adult education I could not do credit to the work of the American Legion, the Elks, the 4-H Clubs, the General Federation of Women's Clubs, the National Congress of Parents & Teachers, and the National Grange unless I had hours instead of minutes at my disposal. Perhaps an example will suffice: Under the auspices of the American Legion more than 3500 separate showings of the two films, "Inertia" and "The Other Fellow" have been made to more than a million people. The other organizations are all carrying on active campaigns of education in safe driving among their members. Of equal and perhaps greater importance is the organized support these fine groups have given to officials in support of sound safety programs.

The political strength of these organizations is the best assurance officials have that they can obtain the necessary legislation and finances to carry forward this "War on Accidents."

Let's speak of the national fatality record for 1937 as compared with 1936. This will undoubtedly show an increase, and may top 40,000 for the first time. However, when that record is subjected to analysis it shows a decrease rather than an increase when measured in terms of fatalities as related to mileage. On that basis, which gives the only true picture of relative

exposure, motor travel is today the safest in the history of available records. The fatality expectancy has now been reduced to one per 7,000,000 miles. But even with this interpretation the record is on the face of it bad. Further analysis is necessary to show the true picture. Safety activity is not carried on nationally but in States and communities. Let us examine the record of those States where there has been a continuing organized safety activity. Their rate is approximately 25 per cent below the national average. Conversely, the 10 worst States where

FORGINGS —

under scientific control



Wyman-Gordon
forgings

are under laboratory control from raw material to finished product. That's why they are always guaranteed forgings.

WYMAN-GORDON

THE CRANKSHAFT MAKERS

WORCESTER, MASS. · HARVEY, ILL. · DETROIT, MICH.

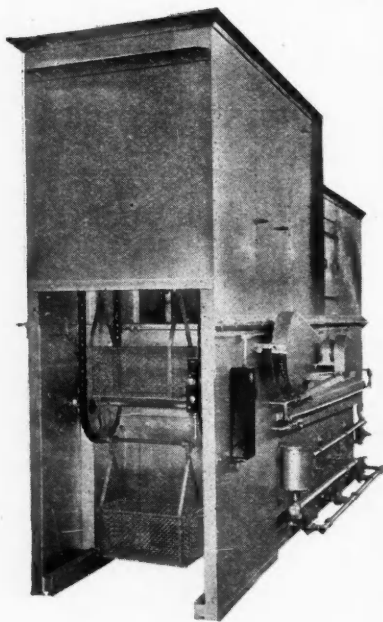
there has been little or no safety activity had a rate approximately 15 per cent above the national average.

Here is another point—that in no State in the union, and I am voicing the opinion of the officials themselves, is there a complete safety program today. In other words, we are not applying our present knowledge on a State-wide basis as yet anywhere. Contemplation of this fact is appalling because so many lives are being lost, so many injuries are being incurred, and so much money is being lost unnecessarily. I wish we knew how the job

could be speeded up but it takes time and money and trained men to arouse the necessary public support so that States and communities can be gotten into action. At the present time the national fatality rate is 15 per 100 million miles of travel. This can and must be brought down to seven, six, or even 5, but again I say, don't expect too much too fast.

When we do get that rate down from 15 to 5 we know it will mean the saving of more than 20,000 lives, 500,000 injuries and six or seven million dollars a year annually in out-of-pocket losses.

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Shown here is an automatic basket type degreaser of smaller construction. It is used for heavy departmental cleaning production and eliminates the cost of extra handling and trucking to a central cleaning department.

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Literature or a free demonstration furnished upon request.

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Bendix Automatic Clutch Control

(Continued from page 710)

within the transmission, the low-reverse shift rail switch circuit is broken and the solenoid valve de-energized, which permits the rotor to turn freely with the finger-tip-control shaft, and the finger will remain in either the low- or reverse-gear position. This is a safeguard against stripping of low or reverse gears due to failure of the shift to be completed at the time the clutch is engaged.

Another refinement in the Electric Hand on 1938 cars has been brought about by making the circuit-breaker switch self-adjusting, which eliminates the need for frequent changes in its setting to keep it properly synchronized with the clutch-engaging point. This has been accomplished by mounting the switch on a spring-loaded plate at the side of the transmission. The switch is now operated directly by an arm extending from the clutch throw-out pick-up lever, the end of which operates in a slot near the base of the plate to which the circuit-breaker switch is attached. As the clutch wears, the lug at the end of this extension arm comes in contact with the upper face of the slot in the plate, which automatically raises the switch to its correct position. Automatic adjustment of the circuit-brake switch makes for smoother shifting.

New-Type Interlock Switch

A change has been made also in the interlock switch, which is now built into the cross-shift or diaphragm cylinder housing and is operated directly from the diaphragm rod. The switch used is of the breaker type and has two sets of breaker points. The circuits through the interlock switch, however, remain the same as on the previous models.

Where the Electric Hand unit is used in connection with the new-type of automatic clutch, the circuits are so changed as to make it possible to operate the car in high gear at speeds considerably below 15-17 m.p.h. and still not have the clutch disengage. The change consists in the introduction of a dash switch which breaks the circuit to ground through the solenoid valve at speeds from idle to governor cut-out speed.

Tracings from Blueprints

Lake Photoprint Co., Inc., Chicago, has developed a method whereby blueprints can be transferred to tracing cloth, providing a new tracing from which unlimited blueprints can be made. The service is especially valuable in cases where original tracings are lost, destroyed, mutilated or otherwise not available.

Truck Show

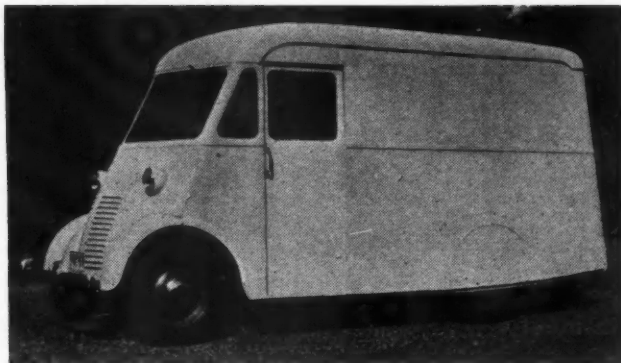
(Continued from page 698)

bus with the new 12-cylinder, 681-cu. in., under-floor engine. The bus has an aluminum body and Cor-ten steel underframe. The manufacturers claim a saving of 1200 pieces by the use of aluminum extensions.

Brockway Motor Co. made the first showing of its cab-over-engine model, which is made in different sizes corresponding to the Models 83 to 150 of its regular line. On the stand were shown vehicles with both a standard three-man cab and with a five-man cab. The latter is built specially for public-service corporations for use in moving men to a job. It has an extra seat back of the driver's seat, with a folding table in front of it attached to the back of the front seat and a light centrally located above the table, on the roof of the cab. The doors are hinged in front, which is held to be a safety feature. In front of the steering post there is a small bench for the driver to put his record books on. On the rear edge of this bench are mounted the controls (starter, choke, throttle and ignition lock). Underneath the floor on opposite sides of the frame there are two compartments, the one on the right serving as a battery chamber and that on the left as the tool box. Both are accessible through hinged doors from the outside. The cab is three-point

SEMI-COE

announced by Willys-Overland Motors, Inc. It is a half-ton truck with a body 90 in. long, 63 in. wide and 62 in. high in the clear in the body. Body panels are ply metal. Door and windshield windows are arranged to give broad visibility. A special low ratio truck rear axle is standard. Wheelbase is 100 in., turning radius 17 ft.



mounted and is provided with a bottom slot centrally at the back, which permits of removing the transmission from the chassis without disturbing the cab. In the five-passenger cab the cushion of the front seat is curved in front so as to be adequately wide where the driver and front-seat passenger are actually seated and still enable them to get by the centrally-mounted control levers. This public-service or utility truck also is equipped with what is referred to as a periscope, in the roof of the cab. This is of advantage when raising poles with a derrick. The derrick is operated from the front seat and in certain positions the pole cannot be seen through the rear window of the cab but may then be observed through the "periscope." A feature of equipment of these trucks is a direction indicator which gives a signal at both

front and rear when the driver is about to change his course. This device is operated by a control lever mounted underneath the steering wheel, and the signal is automatically switched off by the steering wheel as soon as that is returned to the straight-ahead position.

Excellent driver's vision is assured by providing triangular glasses at the front corners of the cab, which can be opened for ventilation, as desired. In front of the inclined windshield there is a short, transversely-hinged hood which can be raised for such service operations as adding water to the cooling system and checking the oil in the crankcase.

Reo exhibits a new 25-passenger bus chassis with the frame extending far forward of the front axle and the engine completely ahead of the axle. For city operation this bus is provided with



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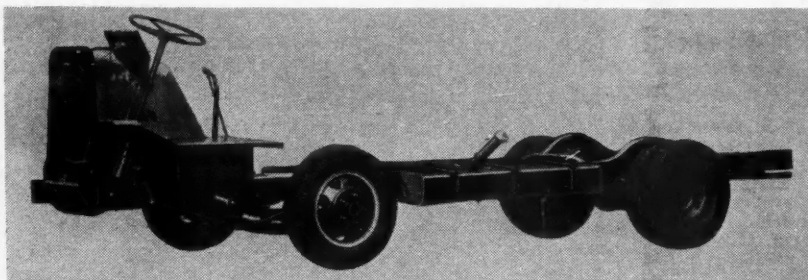
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REO BUS chassis which carries the engine and controls ahead of the front axle and far enough forward that the entry door on the city model is placed in front of the front wheel. Different sizes are

available for several sizes of bodies. Gold Crown engines are used, with either the 268-cu. in. or the 309-cu. in. model available. A tubular drag link extends backward from the steering gear to the knuckle.

a body having the door ahead of the front wheel, while for inter-city operation the door is located behind the wheel. This chassis is normally equipped with a 309-cu. in. engine but is available also with a 268-cu. in. engine and in different lengths. The driver is seated at the side of the engine and the steering post is mounted at the extreme front end of the chassis, a long tubular drag link extending back from it to the steering knuckle. The 42-gal. fuel tank is mounted on the left side of the frame, as is customary in bus work. A vacuum-suspended booster brake is fitted.

Four-wheel Drive Co., which has a representative exhibit of its trucks at the show, has been endeavoring to improve the frontal appearance of its

vehicles, a particularly difficult task in the case of a four-wheel-drive vehicle on account of the somewhat higher frame and the driving mechanism associated with the front axle. Rear axles also have been redesigned and a feature of the new axles is mounting pads for the diaphragm chambers of air brakes. The company supplies trucks for many special purposes. It has built special vehicles for use in the lettuce fields in California, with a tread of 84 in. It also has developed a new earth-boring machine with the engine located at the rear and the boring machine at the front.

Mack Trucks, Inc., shows a large array of its products, including a Model EH equipped with a eutectic-refrigerator ice-cream body of 630 gals.

capacity. The eutectic jelly-like refrigerating substance is contained in thin tanks suspended along the ceiling and between compartments. Inside these tanks there are thin wine pipes through which cold wine is circulated during the night, whereby the jelly is reduced to the solid state. In day time this eutectic jelly absorbs heat and is gradually converted to the liquid state, thereby refrigerating the body. The refrigerant carried has a refrigerating capacity equal to that of 600 lb. of solid carbon dioxide.

Other Mack exhibits include a Model BM carrying 18 oil barrels, a BM tractor and semi-trailer for the transportation of beer, the train being 35 ft. long; a BX chassis intended to bring out structural features, and a CJ traffic-type, high-lift coal truck which is displayed with the body raised to the maximum height. There is also shown a collection of major parts entering into the assembly of Mack trucks, these taken from stock without special finish. Of particular interest among these is a brake drum casting of high-nickel, high-chromium cast iron which measures 20 in. in diameter and has a face width of 10 in. It is provided with cooling fins on the outside.

Chevrolet Motor division has a large and representative exhibit of its commercial vehicle models at the show. These new models were described in the Oct. 23 issue of *AUTOMOTIVE INDUSTRIES*.

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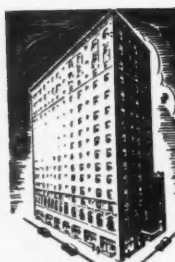
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